

REVISION OF THE FLEA GENUS *JELLISONIA* TRAUB, 1944 (SIPHONAPTERA: CERATOPHYLLIDAE)

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ABSTRACT

The flea genus *Jellisonia* Traub, 1944, is revised with recognition of two subgenera (*Jellisonia* Traub and *Pleochaetoides* Augustson), description of two new species and one new subspecies (*Jellisonia eckerlini*, *Jellisonia maxwelli*, and *Jellisonia breviloba barrerae*), new synonymy of two species (*Jellisonia dybasi* Traub, 1950 = *Jellisonia klotsi* Traub, 1944; *Jellisonia bonia* Traub and Johnson, 1952 = *Jellisonia wisemani* Eads, 1951), three new combinations (*Kohlsia falcata* Méndez and Hanssen, 1975 = *Jellisonia falcata*; *Kohlsia tiptoni* Méndez and Altman, 1960 = *Jellisonia tiptoni*; *Jellisonia ortizi* Vargas, 1951 = *Kohlsia ortizi*), and change of status for one species (*Jellisonia hayesi breviloba* Traub, 1950 = *Jellisonia breviloba*). The northern and southern extremes for the genus *Jellisonia* are Dallas County, Texas, U.S.A., and Meta Department, Colombia, respectively. A generic key to *Jellisonia* and allied genera (*Baculomeris* Smit, 1983; *Kohlsia* Traub, 1950; *Pleochaetis* Jordan, 1933; *Phusaetis* Smit, 1983) and including subgenera and known species of *Jellisonia*, is provided. Distribution maps are given for all species of *Jellisonia*. Fifty-eight percent of the specimens examined (736/1261), were collected between 1960 and 1969, while only 16% (203/1261) were collected after 1969. The current number of valid species-group taxa in *Jellisonia* is 17.

KEY WORDS: *Jellisonia*, *Kohlsia ortizi*, new species, geographic distribution, fleas, taxonomy

INTRODUCTION

The flea genus *Jellisonia* has received little attention from revisionary systematists, although specialists have continued to describe new species intermittently following the original description of the genus. In December 1944, both Traub and Augustson published descriptions of new genera based on species now considered to be congeneric in *Jellisonia*, specifically *Jellisonia klotsi* Traub (1944) and *Pleochaetoides bullisi* Augustson (1944). Traub's publication was dated 20 December 1944 and Augustson's issue was dated December 1944. Traub (1950) correctly synonymized *Pleochaetoides* with *Jellisonia*. Lewis (1990) listed 12 valid species-group taxa in *Jellisonia* (*J. amadoi* Ponce-Ulloa, 1988; *J. bonia* Traub and Johnson, 1952; *J. bullisi* (Augustson 1944); *J. dybasi* Traub, 1950; *J. grayi* Hubbard, 1958; *J. hayesi hayesi* Traub, 1950; *J. h. breviloba* Traub, 1950; *J. ironsi* (Eads 1947); *J. johnsonae* Tipton and Méndez, 1961; *J. klotsi* Traub, 1944; *J. mexicana* Ponce-Ulloa, 1988; *J. wisemani* Eads, 1951) but overlooked *Jellisonia ortizi* Vargas, 1951. Morales (1990) subsequently described *Jellisonia guerrerensis* and Hastriter and Eckerlin (2003) described *Jellisonia painteri*. Prior to the current revision, there were 15 recognized species-group taxa (including subspecies) in the genus.

The author recently obtained a small collection of fleas from Oaxaca, Mexico, which included specimens of *Jellisonia*. Attempts to identify these specimens proved difficult and enigmatic without up-to-date keys and no modern treatment of the genus. Traub's (1950) key to the species known at that time included only six names. Additional keys to include the eight subsequently described species did not exist. The systematic status of several species within *Jellisonia* and the closely allied

genus *Kohlsia* were questionable. Factors making the revision of *Jellisonia* difficult include: 1) very few records existed for the Central American countries of Belize, Costa Rica, Honduras, and Nicaragua; 2) systematics of the mammalian hosts were poorly understood during the period of greatest collecting activity (1950s and 1960s) and the host data on many specimens indicate only a generic identification (recent research using DNA sequence data and karyotyping will undoubtedly make some of these erroneous); 3) many flea specimens had been poorly mounted, making their study difficult; and 4) there was no alcohol-preserved material for preparing dissections desirable for detailed studies.

Jellisonia belongs to the family Ceratophyllidae and representatives are distributed from north central Texas, U.S.A., to northern Panama (one species recorded in Colombia). These fleas are usually montane species parasitizing small murid rodents belonging to the subfamily Sigmodontinae, e.g., species of *Baiomys* True, *Habromys* (Hooper and Musser), *Megadontomys* Merriam, *Neotoma* Say and Ord, *Neotomodon* Merriam, *Nyctomys* Saussure, *Oryzomys* Baird, *Osgoodomys* Hooper and Musser, *Peromyscus* Gloger, *Reithrodontomys* Giglioli, *Scotinomys* Thomas, *Sigmodon* Say and Ord, and *Tylomys* Peters. With few exceptions, species of *Jellisonia* are not always host specific on this group of mammals, and are occasionally found on small mammals other than sigmodontines (specimens were examined in this revision from *Bassariscus* Coues, *Chaetodipus* Merriam, *Cryptotis* Pomel, *Didelphis* Linnaeus, *Dipodomys* Gray, *Liomys* Merriam, *Microtus* Schrank, *Mus* Linnaeus, *Nyctinomys* Miller, *Rattus* Fischer, *Sorex* Linnaeus, and *Tamandua* Gray). Flea genera most closely allied to *Jellisonia*

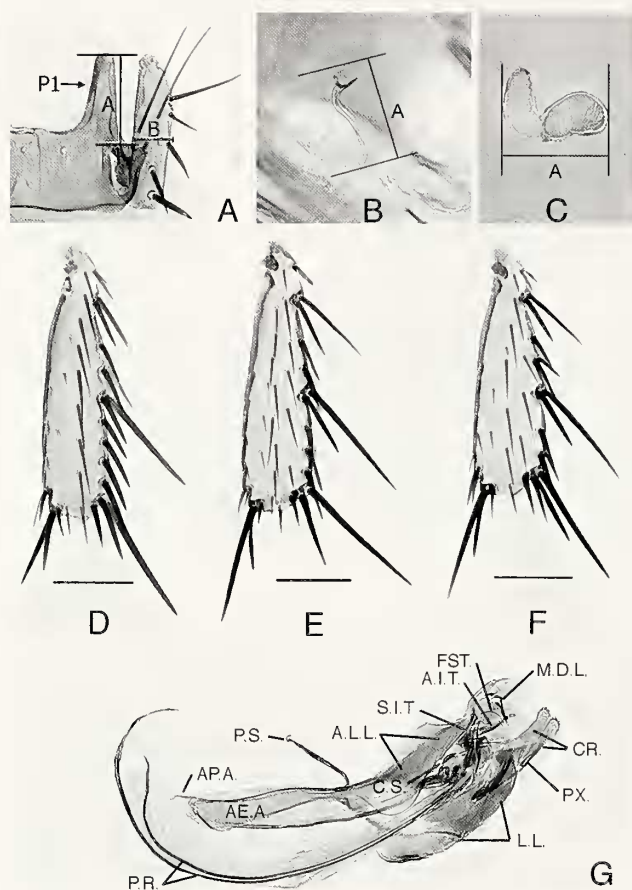


Fig. 1.—Morphological features of *Jellisonia*: A, Male tergum IX [A = length of process I (P1), B = width of telomere]; B, Bursa copulatrix (A = length); C, Spermatheca (A = length); D, Metatibia of *J. klotzi*; E, Metatibia of *J. bullisi*; F, Metatibia of *J. ironsi*; G, Aedeagus of *J. klotzi* (A.L.L., accessory lateral lobe; A.E.A., aedeagal apodeme; A.P.A., apical appendage; A.I.T., armature of sclerotized inner tube; C.S., crescent sclerite; CR., crochet; F.S., Ford's sclerite; FST., fistula; L.L., lateral lobe; M.D.L., median dorsal lobe; PX., paxillus; P.R., penis rods; P.S., proximal spur of aedeagus).

include *Baculomeris* Smit (1983), *Kohlsia* Traub (1950), *Pleochaetis* Jordan (1933), and *Plusaetis* Smit (1983). *Jellisonia* is sympatric with each of these genera throughout much of their ranges. During this revision, the author studied specimens from many localities not previously published in the literature. Geographical records documented in this revision under "Material Examined" contribute greatly to an understanding of species distributions and provide a basis for identifying geographical gaps in the range of *Jellisonia* species that should be a focus for future field research.

MATERIALS AND METHODS

An understanding of the complicated aedeagus and associated anatomy of the modified abdominal segments of the male requires dissection. Alcohol specimens were not available for any of the species studied; therefore, dissec-

tions were prepared from existing slide-mounted material. Slide mounted specimens were selected and placed in petri dishes in xylene until the Canada balsam medium was dissolved sufficiently to free the specimens (usually overnight). Dissections were made in xylene by removing the right tergum IX, aedeagus, and sternites VIII and IX with *minuten nadeln* mounted on the tips of applicator sticks. Because of their extremely small size, these anatomical parts were picked up under one dissecting scope with a micro-spatula and transferred onto a microscope slide in a small drop of Canada balsam under another dissecting microscope. The remaining whole flea was mounted on the same slide as the dissected parts under a second cover slip.

Two ratios were used in the study to discriminate some species. The first was the ratio of the length of the process I of the telomere (P1) to the width of the telomere ($\text{Length of P1/Width of Telomere} = \text{Ratio}$) (Fig. 1A). The length of P1 was measured from the upper portion of the condyle of the telomere to the apex of P1. The width of the telomere was measured at the level of the third marginal spiniform seta (counting from proximal to distal). The second ratio was the length of the sclerotized portion of the bursa copulatrix compared to the length of the spermatheca (Fig. 1B–C). The overall body dimensions were measured from the foremost portion of the frons to the posterior margin of the telomere in males, and to the posterior border of the sensilial plate in females. Anatomical terminology follows that of Rothschild and Traub (1971) and new terminology described in Hastriter and Eckerlin (2003).

Specimens of *Jellisonia* were gathered from many institutions. Following is a listing of those institutions with their associated acronyms. Throughout the text, these acronyms are placed in parentheses after the "Type Species" or "Material Examined" sections to designate repository or collection where specimens are maintained. All specimens with data preceding the acronym belong to that institution: AMNH—Division of Invertebrate Zoology, American Museum of Natural History, New York, New York; BMNH—Department of Entomology, The Natural History Museum, London, England; BYU—Brigham Young University Flea Collection, Monte L. Bean Life Science Museum, Provo, Utah; CMNH—Section of Invertebrate Zoology, Carnegie Museum of Natural History, Pittsburgh, Pennsylvania; CNC—Canadian National Collections of Insects, Arachnids and Nematodes, Ottawa, Ontario, Canada; FMNH—Division of Insects, Field Museum of Natural History, Chicago, Illinois; FSCA—Florida State Collection of Arthropods, Division of Plant Industry, Florida Department of Agriculture, Gainesville, Florida; GML—Gorgas Memorial Laboratory (formerly), Balboa, Panama; INDRE—Instituto de Diagnóstico y Referencia Epidemiológicos (formerly Instituto de Salubridad y Enfermedades Tropicales), Mexico City, Mexico;

MWH—Personal Collection of Michael W. Hastriter, Monte L. Bean Life Science Museum, Provo, Utah; REL—Personal Collection of Robert E. Lewis, Professor Emeritus, Iowa State University, Ames, Iowa; RPE—Personal Collection of Ralph P. Eckerlin, Professor, Northern Virginia Community College, Annandale, Virginia; UNAM—Museo de Zoología, Universidad Nacional Autónoma de México, Mexico City, Mexico; USNM—Division of Systematic Biology-Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Distribution maps were constructed using ArcView GIS 3.3 for Windows and Adobe Photoshop 7.0. Line drawing illustrations were prepared with the aid of a Ken-A-Vision™ Microprojector, Model X1000-1. An Olympus BX61 Compound Microscope, Olympus CV12 digital camera, Olympus Microsuite™ B3SV program, and Adobe Photoshop 7.0 were used to prepare digitized images.

SYSTEMATIC ACCOUNT

Order Siphonaptera
Family Ceratophyllidae

Genus *Jellisonia* Traub, 1944

Jellisonia Traub, 1944.

Type Species: *Jellisonia klotzi* Traub, 1944. Field Museum of Natural History, Zoological Series, 29: 211–214 (FMNH) (by monotypy).

Pleochaetoides Augustson, 1944.

Type Species: *Pleochaetoides bullisi* Augustson, 1944. Journal of Parasitology, 30: 366–368 (by monotypy).

Structural characters used to distinguish the vast majority of species belonging to the Ceratophyllidae are found in males. Females are very similar in appearance and often cannot be reliably distinguished without accompanying males or by their geographic distribution. *Jellisonia* is no exception. The most stable and representative characters for most species of *Jellisonia* are found in the modified segments of the male (tergum IX, sternum IX, and the aedeagus). The caudal margin of sternum VII of females may be highly variable within the same population of some species but is consistent and useful in other species. The spermatheca offers little basis for taxonomic discrimination across the genus. The bulga and hilla are usually subequal in length. The hilla of any one species may or may not possess an apical papilla. The shape and length of the bursa copulatrix is useful in discriminating between some species.

Diagnosis.—This species is closely related to *Kohlsia*, from which it is distinguished in the male by the presence of an apical appendage on the aedeagal apodeme, two inverse setae on the distal arm of sternum IX, and tubercles at the apex of the crochet. The bulga is longer than wide with sides somewhat parallel (convex dorsally and

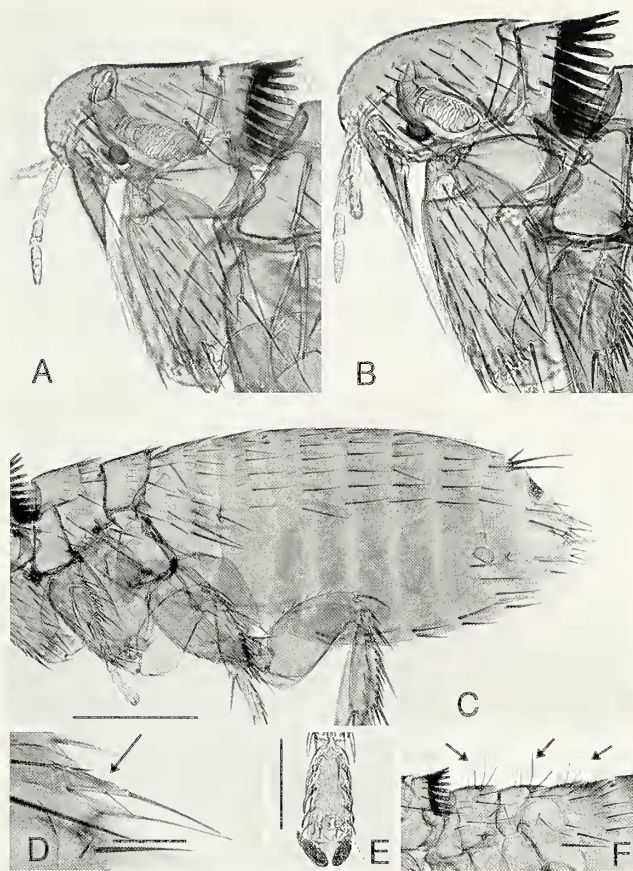


Fig. 2.—A–E, *Jellisonia painteri*: A, Head, male; B, Head, female; C, Thorax and abdomen, female; D, Anal stylet, arrow; E, Fifth segment of hind tarsi; F, *Jellisonia amadoi*, thorax (arrows indicate “mane”). (Scale = A–D, F are 200μ; E is 100μ).

usually concave ventrally), while the spermatheca of *Kohlsia* is more globular. Other genera often confused with *Jellisonia* are *Baculomeris*, *Plusaetis*, and *Pleochaetis*. Males of *Jellisonia* are readily separable from these genera by the presence of one guard seta at the apex of the fore femur, the absence of an incision or cleavage on the ventral margin of the distal arm of sternum IX (forming two lobes), and lack of Wagner’s organ. Females are distinguished by the chaetotaxy of the anal stylet, which bears only a minute dorsal seta, a long apical seta, and a long ventral seta (a character shared by *Kohlsia*) (Fig. 2D).

Description.—**Head** (Fig. 2A–B). Frons evenly rounded, frontal tubercle present but small. Longitudinal dorsal sulcus of occipital area present but shallow in male. Antennal sulcus absent in female, present in male. Preantennal and postantennal areas each with three rows of setae, variable numbers in each row; preantennal area occasionally with fourth row of a single seta. Surface area punctate anterior to first row; smooth posterior to row. Oral angle with small incassation; one or two setae below angle. Maxilla acutely pointed, maxillary palpus with five segments, never exceeding apex of fore coxa. Antennal pedicel not ensheathing clavus, with fringe of short setae; terminal one or two segments of clavus extending onto prosternum in male. Eye well developed, darkly pigmented, not sinuate. Genal process subacute; genal teeth lacking. Setae in fringe along dorsal margin of antennal fossa few,

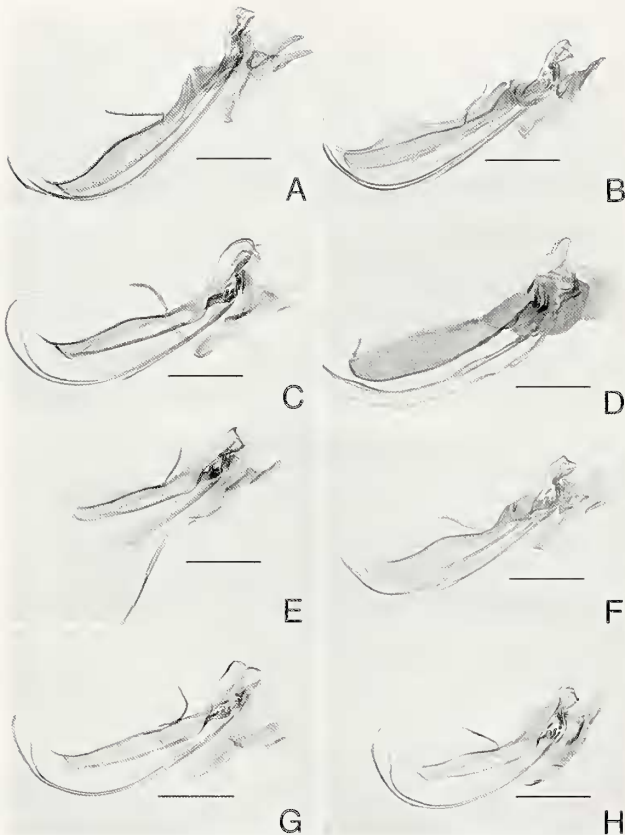


Fig. 3.—Aedeagi of *Jellisonia* species: A, *J. breviloeba barrerai*, n. ssp.; B, *J. b. breviloeba*; C, *J. eckerlini*, n. sp.; D, *J. falcata*; E, *J. guerrenensis*; F, *J. hayesi*; G, *J. johnsonae*; H, *J. klotzi*. (Scale = 200 μ).

variably distributed. **Thorax** (Fig. 2C, F). Pronotum narrow, width much less than length of 18–20 spines; with single row of setae. Prosternum with notch for cervical link plate. Mesonotum with three rows of setae and scattered anterior setae; mesonotal collar with variable numbers of pseudosetae. Mesopleural rod bifurcate dorsally. Lateral metanotal area with two setae. Metanotum with three rows of setae, with or without apical spinelets; notal ridge well defined. Metapleural rod thick, pleural arch well developed. Metepisternum and metasternum with an incomplete sclerotized division. Metepisternum with squamulum. Metepimeron with three vertical rows of setae, posterior two rows ventral to spiracle. **Legs** (Fig. 1D–F, 2E). Fore femur with numerous lateral setae and one mesal seta. Dorsal margin of fore tibia with false comb. Dorsal margins of mesotibia and metatibia with or without false combs; if with false combs, single lateral row of setae (otherwise double). Caudal margin of fore tarsal segment I with “comb” of three setae. Five pairs of lateral plantar bristles, proximal pair shifted onto plantar surface. Two preapical plantar bristles, hair-like or subspiniiform. Oblique break line of mesoeocha incomplete. Metacocha without patch or row of spiniiform setae or any setae on mesal surface; anterior margin adorned with fine setae. Ventrocaudal margin of metacocha with incised notch. **Unmodified Segments of Abdomen** (Fig. 2C). Marginal spinelets on tergites I–III, sometimes IV; tergites II–VII with two rows of setae, one seta below level of spiracle on each. Spiracular fossa round. Antescutal bristles three, although mesal and lateral bristles of males may be minute. Sternum II with one seta on each side; sternites III–VI with either two or three on each side. **Modified Segments of Male** (Fig. 1G 3–17). Tergum VIII enveloping whole of tergum IX; setal arrangements variable. Basimere of tergum IX variably extended caudad with triangular or finger-like process PI above articulation of telomere. Two acetabular bristles emerging near acetabulum, arising from lobe or not. Telomere bear-

ing three to six marginal setae, either slender or spiniiform. Sternum VIII vestigial, pencil-like or more developed, with or without setae. Apex of sternum VIII with or without membranous extensions. Spiculated intersegmental membrane connecting sternites VIII and IX apparent in some species, absent in others. Proximal portion of distal arm of sternum IX. (about one-third to one-half length) sclerotized, not lobate; distal portion variously expanded with a mesal sclerotized longitudinal groove. Membranous area at juncture of proximal and distal portions of distal arm of sternum IX (appears to be a point of flexure for distal portion of distal arm). Paired distal arms of sternum IX fused to flexure point some distance beyond. Lateral apical aspect of sternum IX with two setae directed cephalad [termed ventral and dorsal inverse setae by Hastriter and Eckerlin (2003)], dorsal inverse seta always small (absent in *Jellisonia falcata* and *Jellisonia tiptoni* although an alveolar pit is present). Apodemal rod of sternum IX present. **Aedeagus** (Fig. 1G, 3–8). Apodeme of aedeagus expanded in middle forming a mild dorsal convexity (lateral view); apex with apical appendage and proximal spur at anterior junction of aedeagal pouch (proximal spur connects phallosome to arched roof of tergum IX). External components of end chamber comprised of median dorsal lobe (multiple configurations), paired accessory lateral lobes, sclerotized portion (lateral view) appears acutely pointed (very short in *J. hayesi*, *J. b. breviloeba*, vestigial in *J. b. barrerai*), paired lateral lobes usually sclerotized ventrally. Crochet hyper-developed; positioned along ventral floor of aedeagal pouch. Apex of crochet studded with spicules or tuberculate structures (termed micromucronate by Traub 1950); paxillus present. Crescent sclerite short, thickened in middle with satellite sclerite caudad. Sclerotized inner tube short, moderately sclerotized with paired armature of sheath of inner tube extending over sclerotized inner tube. Fistula present at apex of sclerotized inner tube; approximately equal length of latter. Penis rods extend beyond aedeagal apodeme but do not form a complete coil. **Modified Segments of Female** (Fig. 18–22). Tergum VIII large, chaetotaxy varies. Anal stylet of dorsal anal lobe 3–5 times as long as wide; single apical long seta; small ventral seta; and minute dorsal seta at apex sometimes present. Ventral anal lobe angulate with slender spiniiform setae. Sternum VII with complex of lobes and sinuses, no marked sclerotization on caudal margin. Sternum VIII inconspicuous, without setae (although minute hairs may adorn apex of some species). Bulga of spermatheca subequal in length to hilla, convex dorsally, coneave ventrally; not globular. Bursa copulatrix sclerotized, straight, sigmoid, or undulate; upper one-fourth never flexed forward at right angle.

Remarks.—I have divided the genus into two subgenera based on chaetotaxy of the metatibia. The subgenera each tend to follow a different pattern of distribution. Although there is much overlap between them, members of the subgenus *Pleochaetoides* are most common in the northern range of the genus, whereas those of the subgenus *Jellisonia* are more abundant from central Mexico to the southern limits of the range of the genus. The most notable exception is that of *J. (P.) ironsi*, which spans much of the range of both subgenera, occurring from northern Texas to central Costa Rica. This may be attributed to its close association with its principle host, *Baiomys taylori* (Thomas 1887), whose range *J. ironsi* closely follows. Other species of *Jellisonia* are rarely found on *B. taylori*.

KEY TO THE SUBGENERA AND SPECIES OF *JELLISONIA* AND ALLIED GENERA

- I. Guard seta at apex of fore femur single. Male: Distal arm of sternum IX not divided into two lobes by an incision (cleft) on ventral margin and Wagner's organ is absent. Female: Anal stylet with minute dorsal seta (near apical seta), long apical seta, and long ventral sea 2

- 1'. Two guard setae present (mesal seta may be hidden behind the larger lateral seta). Male: Distal arm of sternum IX divided into two lobes and Wagner's organ present. Female: Anal stylet with long dorsal seta (set well cephalad of apex), apical and ventral setae same as above 3
- 2(1). Male: Two inverse setae present on dorsal margin towards apex of distal arm of sternum IX (Fig. 14C); apical appendage of aedeagal apodeme present (although short). Female: Bursa copulatrix usually subequal to length of spermatheca, straight or undulate (Fig. 22H-I), but perula never reflected cephalad at a right angle at distal one-fourth; bulga of spermatheca slightly concave beneath and convex dorsally, longer than wide (*Jellisonia*) 5 (Page 218)
- 2'. Male: Inverse setae and apical appendage absent. Female: Bursa copulatrix longer than length of spermatheca and perula reflected cephalad (Fig. 21B); bulga shorter, hilla relatively longer and more globular *Kohlsia*
- 3(1'). Most ventral seta in frontal row at same level of frontal tubercle (or nearly so) *Baculomeris*
- 3'. Ventral seta much lower than frontal tubercle, nearer base of maxillary palpus 4
- 4(3'). Male: Length of penis rods far exceeding apex of aedeagal apodeme, forming a full coil or more; apical appendage long (longer than maximum width of aedeagal apodeme); and apical half of telomere lacking short dark spiniform setae. Female: Proximal duct of spermatheca visibly dilated *Phnasetis*
- 4'. Male: Penis rods exceed length of aedeagal apodeme but are not substantially curved upward and do not form even a partial coil; apical appendage short (shorter than maximum width of aedeagal apodeme); one or more short, dark spiniform seta(e) present on ventroapical margin of telomere. Female: Proximal duct of spermatheca not noticeably dilated *Pleochaetis*
- 5(2). Metatibia with a false comb along dorsal margin. Metatibia with ten or more dorsal notches; a single seta in penultimate dorsal notch, and one vertical row of setae on lateral tibial surface (Fig. 1D) *Jellisonia* (*Jellisonia*) 6
- 5'. Metatibia without false comb along dorsal margin. Metatibia with eight or nine dorsal notches; two setae in penultimate dorsal notch, and two vertical rows of setae on lateral tibial surface (Fig. 1E-F) *Jellisonia* (*Pleochaetoides*) 25
- 6(5). Male 7
- 6'. Female 17

Males

- 7(6). Width of process one (P1) much greater than height. Telomere much wider apically than basally (Fig. 1A). Median dorsal lobe sclerotized and hook-like with ventral secondary lobe (Fig. 5D, 7A). Caudal margin of sternum IX adorned with 11–12 spiniform setae (Fig. 7A, 14D) (Guatemala to Colombia) 8
- 7'. P1 narrower and finger-shaped. Telomere usually narrows towards apex. Median dorsal lobe not hook-like and without a ventral secondary lobe. At most, 1–2 small spiniform setae on caudal margin of sternum IX (Fig. 14A, C) 9
- 8(7). Telomere with three large setae along caudal margin (Fig. 9D)(Colombia) *J. (J.) falcata* (Page 224)
- 8'. Telomere with four large setae along caudal margin (Fig. 10E)(Guatemala to northern Panama) *J. (J.) tiptoni* (Page 230)
- 9(7'). Median dorsal lobe not smoothly rounded and with a loop-like sclerotization intruding inward at anterodorsal margin (Fig. 5A–B, F). Crochet with round flask-shaped base (Fig. 5A–B). Small but distinct lobe on distal arm of sternum IX anterior to, or below level of ventral inverse seta (Fig. 13A–B), or lacking (Mexico) 10
- 9'. Median dorsal lobe smoothly rounded, without a loop-like sclerotization (Fig. 5C, 6A). Crochet linear, without round

flask-shaped base (Fig. 5C, E). Lobe on anterior margin of sternum IX never present (Fig. 13C, F)(Costa Rica, Guatemala, Mexico, or Panama) 13

- 10(9). Lobe on distal arm of sternum IX anterior to and on the same level as the ventral inverse seta (Fig. 14B) 11
- 10'. Lobe if present, below level of ventral inverse seta (Fig. 13A, B) 12
- 11(10). Apex of sternum IX forming an oblique 45° angle from ventral inverse seta to blunt apex (Fig. 14B). Sternum VIII pencil-like with setae (Fig. 17B) *J. (J.) maxwelli* n. sp. (Page 228)
- 11'. Apex of sternum IX convex along anterior margin above inverse seta and rounded at apex (Fig. 13E). Sternum VIII pencil-like without setae (Fig. 16E) *J. (J.) hayesi* (Page 225)
- 12(10'). Ventrocaudal margin of Ford's sclerite with distinct lobe (Fig. 5A). Sternum VIII with setae (Fig. 16A) *J. (J.) breviloba barrerae* n. ssp. (Page 221)
- 12'. Ford's sclerite strap-like without distinct lobe on ventrocaudal margin (Fig. 5B). Sternum VIII lacking setae (Fig. 16B) *J. (J.) breviloba breviloba* (Page 218)
- 13(9'). Apex of sternum IX abruptly turned caudad (like a hockey stick)(Fig. 13C, F) 14
- 13'. Apex of sternum IX not projecting caudad (Fig. 14C) 15
- 14(13). Apical sclerite of median dorsal lobe acutely pointed apically (Fig. 6A)(Costa Rica and Panama) *J. (J.) johnsonae* (Page 226)
- 14'. Apical sclerite round, narrowly blunt (Fig. 5C)(Costa Rica) *J. (J.) eckerlini* n. sp. (Page 222)
- 15(13'). Caudal margin of sternum IX with gentle convexity (Fig. 14C)(Guatemala) *J. (J.) painteri* (Page 229)
- 15'. Caudal margin of sternum IX with concavity in middle creating a proximal and distal lobe each bearing small spiniform setae (Fig. 13D–E, 14A)(Mexico) 16
- 16(15'). Marginal spiniform setae on telomere somewhat evenly spaced; distance between second and third spiniform setae (from proximal to distal) about equal or less than width of telomere at level of third spiniform seta. Caudal margin of telomere usually convex, or nearly straight. Ventral caudal lobe of telomere not particularly enlarged (Fig. 10B)(Mexico) *J. (J.) klotsi* (Page 227)
- 16'. Two most ventral marginal spiniform setae distinctly grouped and separated from more dorsal spiniform setae; distance between second and third spiniform setae distinctly greater than width of telomere at level of third spiniform. Caudal margin of telomere straight to slightly concave. Ventral caudal lobe of telomere more pronounced (Fig. 9E)(Mexico) *J. (J.) guerrerensis* (Page 224)

Females

- 17(6'). Caudal margin of sternum VII with a small, bluntly rounded lobe subtended by an obliquely concave margin extending to an acute ventral lobe (Fig. 20A)(Guatemala to northern Panama) *J. (J.) tiptoni* (Page 230)
- 17'. Ventral lobe usually rounded, sometimes truncate; never acute 18
- 18(17'). Sclerotized portion of bursa copulatrix sigmoid-shaped, much longer than length of spermatheca (1.5–2.0x longer)(Fig. 21D)(Colombia) *J. (J.) falcata* (Page 224)
- 18'. Bursa copulatrix not sigmoid-shaped, subequal to length of spermatheca (may be slightly shorter, or longer than spermatheca) 19
- 19(18'). Sternites IV–VI with two setae on each side (Fig. 18A) ... 20
- 19'. Sternites IV–VI with three setae on each side (Fig. 19A) ... 23
- 20(19). Dorsal lobe on caudal margin of sternum VII large (Fig. 18A, 19D) 21
- 20'. Dorsal lobe small or lacking entirely (Fig. 19B) 21

- *J. (J.) johnsonae* (Page 226)
- 21(20). Sinus on caudal margin of sternum VII as deep as, or deeper than width of lobe (from apex of sinus to closest margin of dorsal lobe) (Fig. 19D) 22
- 21'. Sinus on caudal margin shallow, less than width of lobe (Fig. 18A)(Costa Rica) *J. (J.) eckerlini* n. sp. (Page 222)
- 22(21). Margin above dorsal lobe of sternum VII usually concave (Fig. 18C–H)(Mexico) *J. (J.) klotsi* (Page 227)
- 22'. Margin convex or lobe thickened (females indistinguishable except by geographic locality)(Fig. 18J)
 ...Guatemala: *J. (J.) painteri*, or Mexico: *J. (J.) guerrensis* (Pages 229 and 224)
- 23(19'). Dorsal lobe on caudal margin of sternum VII large with subtending sinus (Fig. 19A, D) 24
- 23'. Dorsal lobe at most indicated; subtending sinus, if present, represented by shallow concavity (females of these three taxa are indistinguishable)(Fig. 19C)
 *J. (J.) b. breviloba*, *J. (J.) b. barrerae* n. ssp., and *J. (J.) maxwelli* n. sp. (Pages 218, 221, and 228)
- 24(23). Sclerotized portion of bursa copulatrix with perula reflected caudad (Fig. 22E) (Guatemala) *J. (J.) painteri* (Page 229)
- 24'. Bursa copulatrix straight, perula not reflected caudad (Fig. 22B)(Mexico) *J. (J.) hayesi* (Page 225)
- 25(5'). Males 26
- 25'. Females (unknown for *J. (P.) amadoi*) 31
- Males
- 26(25). Two apical setae on metatarsal segment I extending to, or beyond apex of metatarsal segment III. *J. (P.) amadoi* (Page 230)
- 26'. Apical setae much shorter, extending at most to apex of metatarsal segment II 27
- 27(26'). Metatibia with 8 dorsal notches (Fig. 1F) 28
- 27'. Metatibia with 9 dorsal notches (Fig. 1E) 30
- 28(27). Median dorsal lobe simple, not bifurcate (Fig. 7C). Sternum VIII vestigial and without seta (Fig. 16F) 29
- 28'. Median dorsal lobe bifurcate (Fig. 7B, D). Sternum VIII well developed and bearing at least one seta (Fig. 17F)
 *J. (P.) ironsi* (Page 232)
- 29(28). Ratio of length of P1 to width of telomere at level of third spiniform seta (counting from proximal) 1.3:1 (Fig. 1A). Median dorsal lobe narrowing towards rounded apex (Fig. 8A)
 *J. (P.) mexicana* (Page 233)
- 29'. Ratio of P1 and telomere 1:1. Median dorsal lobe more broadly rounded (Fig. 8B) *J. (P.) wisemani* (Page 235)
- 30(27'). Ratio of length of P1 to width of telomere 0.5:1 (Fig. 1A). Apex of P1 rounded. Entire condyle of telomere above level of acetabular bristles (Fig. 11A). Width of ventral inverse seta less than width of narrowest portion of distal arm of sternum IX; not lanceolate (Fig. 14E) *J. (P.) bullisi* (Page 231)
- 30'. Ratio of P1 and telomere 1.8:1. Apex of P1 acutely pointed. Most of the condyle below level of acetabular bristles (Fig. 11B). Width of ventral inverse seta equal to or greater than narrowest portion of distal arm of sternum IX; lanceolate (narrow at base, broad in middle, and abruptly acuminate at apex) (Fig. 14F) *J. (P.) grayi* (Page 232)
- Females
- 31(25'). Dorsal notch number seven (counting from proximal to distal) of metatibia with a single seta (Fig. 1F) 32
- 31'. Dorsal notch number seven of metatibia with two setae ... 33
- 32(31). Caudal margin of sternum VII with dorsal and ventral lobes forming a shallow sinus (Fig. 20C) ... *J. (P.) grayi* (Page 232)
- 32'. Caudal margin of sternum VII with only ventral lobe (Fig. 20B) *J. (P.) bullisi* (Page 231)

- 33(31'). Dorsal lobe of sternum VII short but acutely pointed. Sternites III–VI with two setae on each side (Fig. 20D)
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- 33'. Dorsal lobe of sternum VII bluntly rounded. Sternites III–VI with three setae on each side (females are indistinguishable)(Fig. 21A)
 ... *J. (P.) wisemani* and *J. (P.) mexicana* (Pages 235 and 233)

Subgenus *Jellisonia* Traub 1944

Type Species: Jellisonia klotsi Traub, 1944. Zoological Series of Field Museum of Natural History, 29:211–214 (by monotypy and original designation).

Diagnosis.—Traub (1950) cited the presence of supernumerary spines (false combs) on the mesotibia and metatibia as one of the characteristics to define the genus, but a number of species described later do not have false combs. They are present on the dorsal margin of the mesotibia and metatibia of species in the subgenus *Jellisonia* (Fig. 1D) and absent in those placed in the subgenus *Pleochaetoides* (Fig. 1E–F). These supernumerary spines vary in number and are placed between the fourth and the apical fascicles of the tibia. There is one lateral vertical row of setae on those species possessing a false comb (*Jellisonia*) and two lateral vertical rows on those that do not (*Pleochaetoides*). Specialized combs on the metatibia apparently have adaptive significance, since they occur independently in a number of unrelated genera belonging to Leptopsyllidae (*Amphipsylla* Wagner, 1909; *Leptopsylla* Jordan and Rothschild, 1911; *Peromyscopsylla* I. Fox, 1939), Chimaeropsyllidae (*Epirimia* DeMeillon, 1940), and Ischnopsyllidae (*Thamnopsylla* Rothschild, 1907). In every case, there is a reduction in the number of lateral setae when combs are present on the metatibia. Among Ceratophyllidae, tibial combs are exclusive to the subgenus *Jellisonia*. Diagnoses that follow will differentiate only species within the subgenus *Jellisonia*.

Jellisonia (Jellisonia) breviloba breviloba Traub, 1950, new status (Fig. 3B, 5B, 9B, 13B, 16B, 24A)

Jellisonia hayesi breviloba Traub, 1950. Fieldiana: Zoology Memoirs, 1:19, Plate 5. Barrera, 1953:216 [not examined]; Barrera, 1968:71; Muñiz-S. et al., 1981:165 not examined; Ayala-Barajas et al., 1988:68–69; Ponce-Ulloa and Llorente-Bousquets, 1996:558.

Jellisonia hayesi Traub: Tipton and Méndez, 1968:193 [misidentification].

Type Material.—MÉXICO, Michoacán: Mount San Miguel, ex *Microtus mexicanus* (Saussure 1861), 10 May 1933, A. Dampf (holotype male/allotype female) (FMNH).

Diagnosis.—Males of this species are distinguished from other members of the subgenus except *J. breviloba barrerae*, *J. hayesi*, and *J. maxwelli* by the flask-shaped base of the crochet and a loop-like sclerotization intruding inward at the anterodorsal margin of the median dorsal lobe. Males are further separable from *J. hayesi* and

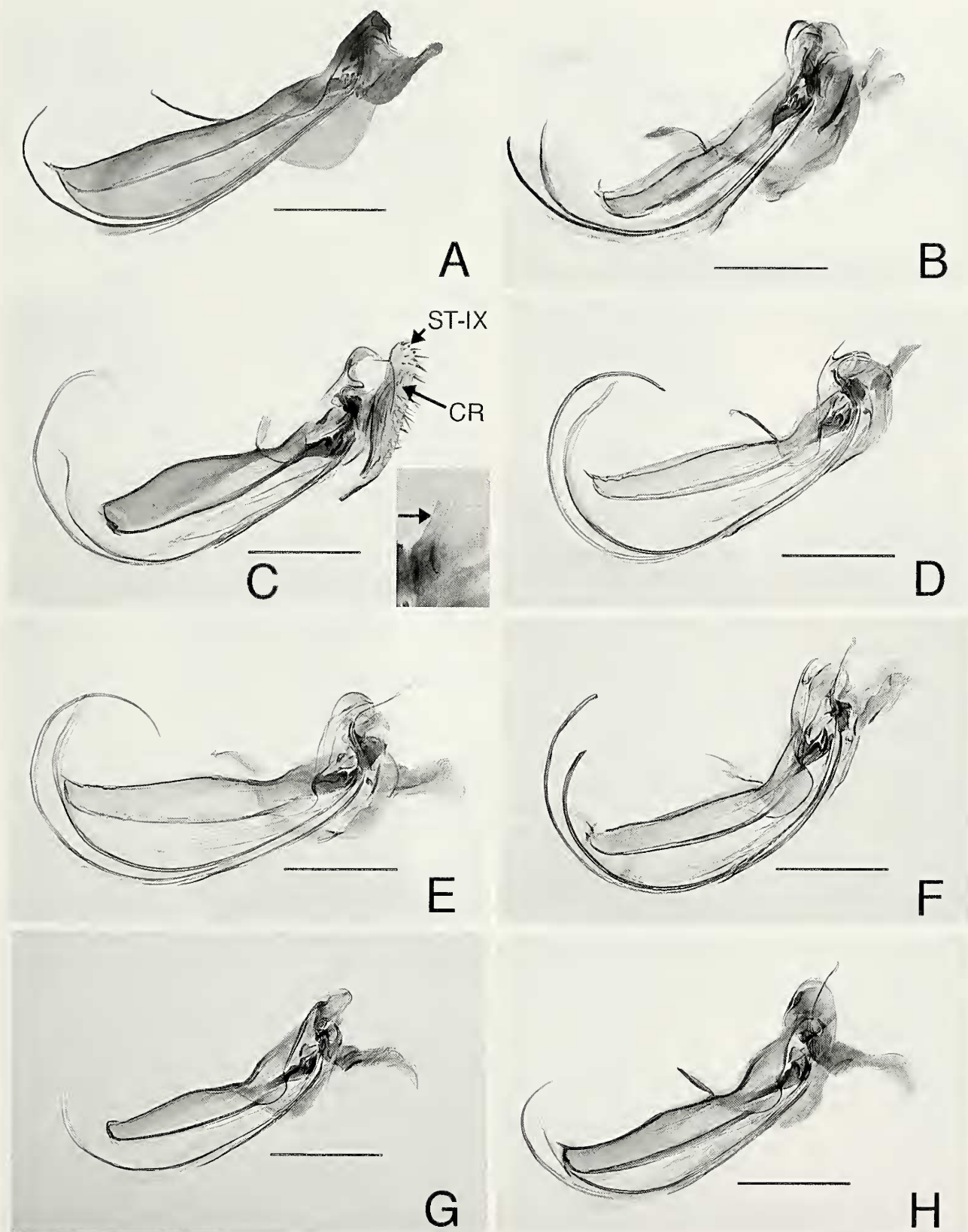


Fig. 4.—Aedeagi of *Jellisonia* species: A, *J. maxwelli*, n. sp.; B, *J. painteri*; C, *J. tiptoni* (enlargement of crochet); D, *J. bullisi*; E, *J. grayi*; F, *J. ironsi*; G, *J. mexicana*; H, *J. wisemani*. (Scale = 200 μ).

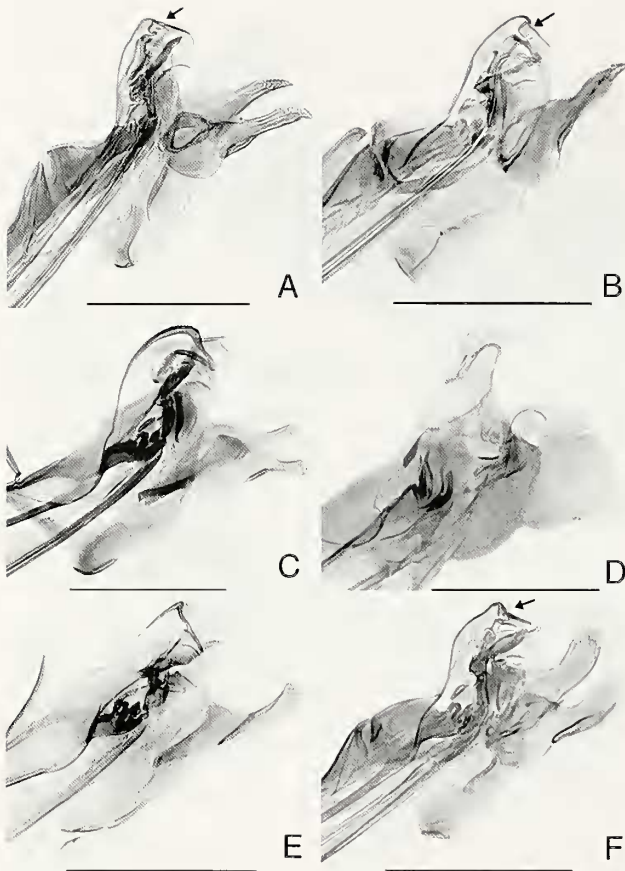


Fig. 5.—Apices of aedeagi in *Jellisonia* species: A, *J. breviloba barrerae*, n. sp.; B, *J. b. breviloba*; C, *J. cckerlini* n. sp.; D, *J. falcata*; E, *J. guerrerensis*; F, *J. hayesi*. Black arrow = loop-like sclerotization; white arrow = vertical sulcus in aedeagal apodeme. (Scale = 200 μ).

J. maxwelli by the conical shape of the apex of the distal arm of sternum IX (broadly rounded and truncate in *J. hayesi* and *J. maxwelli*) and from *J. b. barrerae* by the lack of setae on sternum VIII and without a lobe on the ventrocaudal margin of Ford's sclerite (Fig. 5B). Females are akin to those species whose bursa copulatrix is shorter than the length of the spermatheca and bear three setae on each side of sternites IV–VI (*J. painteri*, *J. hayesi*, *J. maxwelli*, and *J. b. barrerae*). Females are not separable from the latter two species, but differ from the former two taxa by the presence of a small lobe and shallow subtending sinus (Fig. 19C) opposed to a large lobe and deep sinus (Fig. 19A, D).

Material Examined.—**MÉXICO. Coahuila:** La Carbonara, 16 km SE Arteaga, 2075 m, ex *Peromyscus* sp., 2 males, 2 females (CMNH). **Distrito Federal:** "country club," ex *Arvicola mexicana* [= *N. mexicana*], holotype and allotype (FMNH), paratypes (1 male, 1 female) (CMNH); San Andrés, Tetepilco, ex *Microtus mexicanus mexicanus*, 1 male, 1 female (CMNH), 1 male, 5 females (UNAM), 1 female (USNM), 1 male, 8 females (BMNH); Pedregal de San Angel, ex *Peromyscus* sp., 1 female (REL); Cerro Zacayuca, ex *P. truei* *gratus* [= *P. gratus* Merriam, 1898], 1 female (CMNH), 2 females (BMNH). **Durango:** 16 km W El Salto, ex *Peromyscus* sp., 1 female (CNC), 0.8 km SE Buenos Aires, 2650–2683 m, ex *Peromyscus* sp., 5 males, 3 females (CMNH); 6.5 km S El Salto, ex *Peromyscus* sp., 3 males, 4

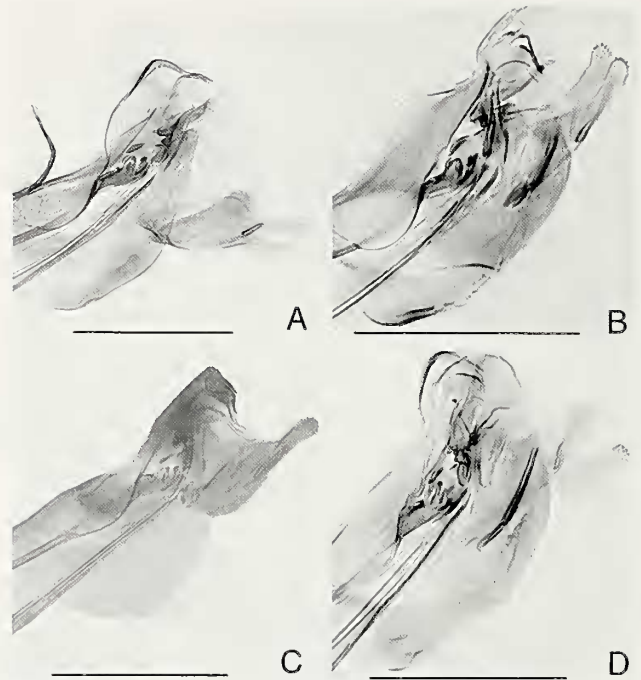


Fig. 6.—Apices of aedeagi in *Jellisonia* species: A, *J. johnsonae*; B, *J. klotzi*; C, *J. maxwelli*, n. sp.; D, *J. painteri*. (Scale = 200 μ).

females (CMNH); 11 km S El Salto, ex *Peromyscus* sp., 1 male, 1 female (CMNH); 1.6 km SW Revolucioneros, 1982–2043 m, ex *Peromyscus* sp., 8 males, 7 females (CMNH); 8 km E Revolucioneros nr Sinaloa border, 1982 m, ex *Peromyscus* sp., 5 males, 2 females (CMNH); 9.7 km NE Revolucioneros, 2378 m, ex *Peromyscus* sp., 1 male, 2 females (CMNH), 2 females (USNM); 11 km NE Revolucioneros, 2470 m, ex *Peromyscus* sp., 9 males, 5 females (CMNH); 8 km W Revolucioneros nr Sinaloa border, 2012 m, ex *Neotoma* sp., 1 male (CMNH); 3.2 km E Revolucioneros, 11.3 km E Sinaloa border, 2226 m, ex *Peromyscus* sp. 1 male, 2 females (CMNH), ex *Neotoma* sp., 1 male (USNM); 8 km E Revolucioneros, 2012 m, ex *Peromyscus* sp., 1 female, ex *Neotoma* sp., 1 male (USNM); 3.2 km E Revolucioneros, 14.5 km E Sinaloa line, 2348 m, ex *Peromyscus* sp., 2 males, 1 female (CMNH); 4.8 km E Revolucioneros, 12.9 km E Sinaloa line, 2286–2378 m, ex *Peromyscus* sp., 7 males, 3 females (CMNH); 19.4 km E Revolucioneros, 27.4 km E Sinaloa line, 2470 m, ex *Peromyscus* sp., 2 males, 5 females (CMNH); 4.8 km E Revolucioneros nr highway, 14.5 km E Sinaloa line, ex *Peromyscus* sp., 2 females (CMNH); 8 km E Revolucioneros nr Highway, 14.5 E. Sinaloa line, 2348 m, ex *Peromyscus* sp., 2 males, 1 female (CMNH); 48 km W Durango, 2439 m, ex *Peromyscus* sp., 1 male, 1 female (CNC). **México:** 1.8 km N Barrientos, ex *Peromyscus truei* [= (Mexican species equal *Peromyscus gratus*)], 1 male, 2 females (CMNH); 3.2 km N Tlalnepantla, ex *P. truei* [= *P. gratus*], 1 male, 1 female (UNAM). **Guanajuato:** 8 km SW Ibarra, 2500 m, ex *Sigmodon fulviventer* J.A. Allen, 1889, 1 female (CMNH). **Guerrero:** 1.6 km NW Omiltemi, 1912 m, ex *Peromyscus* sp., 2 females (CMNH); Puerto Chico, Camotla las Bravo, ex *Peromyscus banderanus* *vicinior* [= *Osgoodonys bandaranus* (J.A. Allen 1897)], 1 female (CMNH); and Playa Azul, ex *P. truei* = *P. gratus*, 2 males, 2 females (GML). **Hidalgo:** 12.9 km NE Jacala, 1738 m, ex *Peromyscus lylocetes*? [= *P. aztecus* (Saussure 1860)], 1 female (CMNH). **Jalisco:** Nevado de Colima, nr La Joya, 3354 m, ex *P. lylocetes* [= *P. aztecus*], 1 male, 1 female (CMNH). **México:** 1.8 km N Barrientos, ex *P. truei* [= (Mexican species equal *P. gratus*)], 1 male, 2 females (CMNH); 3.2 km N Tlalnepantla, ex *P. truei* [= *P. gratus*], 1 male, 1 female (UNAM). **Nuevo León:** Cerro Potosi, 2622–3110 m, ex *Peromyscus difficilis* J.A. Allen, 1891, 4 males, 5 females (BYU), 4 males, 5 females (USNM); Cerro Potosi, 2226 m, ex *P. difficilis*, 1 male (CMNH); Cerro Potosi,

2652–3232 m, ex *Peromyscus melanotis* J.A. Allen and Chapman, 1897, 3 females. **Puebla:** 1.6 km NE Alchichicha, 2420 m, ex *Peromyscus maniculatus* Wagner, 1845, 1 male (USNM), 6 males, 12 females (CMNH). **Querétaro:** 2.5 km NW Santa Inés, ex *Peromyscus furvus* J.A. Allen and Chapman, 1897, 2 males, 2 females (UNAM); 2.8 km NW Santa Inés, ex *P. furvus*, 2 males; Maguey Verde, ex *P. difficilis*, 1 male (UNAM). **Sinaloa:** 1 km NE Santa Lucía, 1128 m, ex *Peromyscus boylii spicilegus* [= *Peromyscus spicilegus* J.A. Allen, 1897], 1 male (CMNH); 19.2 km NE Santa Lucía, ex *P. b. spicilegus* [= *P. spicilegus*], 1 male (CMNH); 1.6 km E Pánuco, ex *N. mexicana*, 1 male. **Tamaulipas:** 16.1 km SSW Ciudad Mante, ex *Tadarida femorosacca* [= *Nyctinomops femorosaccus* (Merriam 1889)], 1 female (CMNH). **Tlaxcala:** Tlaxco, ex *Peromyscus* sp., 3 males, 2 females (CMNH).

Remarks.—This taxon is elevated to specific status and is no longer considered a subspecies of *J. hayesi* (see Remarks under *J. hayesi*). One male (of 88 specimens) from the state of Durango possessed a single seta on sternum VIII, a character that normally separates this subspecies from *J. b. barrerae*. The sternum VIII of all *J. b. barrerae* examined bore setae and usually two pairs. The specimen from the state of Tamaulipas is the only *Jellisonia* recorded from that state and it was collected from a bat.

Jellisonia (Jellisonia) breviloba barrerae, new subspecies

(Fig. 3A, 5A, 9A, 13A, 16A, 24B)

Type Material.—**MÉXICO. Distrito Federal:** Meyehualco, 5 km E Santa Cruz, ex *P. difficilis*, 2 males (UNAM); Cerre Zacayuca, *P. truei gratus* [= *P. gratus*], 1 male, 1 female (REL); 21 ? [sic] W Zacatepec, 400 m, ex *P. maniculatus*, 1 male (BMNH). **Morelos:** Lagunas de Zempoala, near Ojo de Agua, 2287 m, ex *P. difficilis*, 1 male, 1 female (CMNH); Derrame Chichinautzin, 2440–2505 m, ex *P. difficilis*, 5 males, 4 females (UNAM), 2470 m, ex *Neotoma mexicana torquata* [= *N. mexicana*], 1 female (UNAM). **Puebla:** 1 km SW San Pedro Atlixco (18°58'N 98°28'W), 2200 m, ex *P. difficilis*, 22 February 1964, A. Barrera and T. Alvarez, holotype, allotype, and 17 paratypes (7 males, 10 females) (CMNH); 3 males, 5 females (UNAM). Holotype, allotype, and 12 paratypes (4 males, 8 females) deposited in CMNH, 4 paratypes (2 males, 2 females) in USNM, 20 paratypes (10 males, 10 females) in UNAM, 1 paratype (1 male) in BMNH, 2 paratypes (1 male, 1 female) in REL, and 3 paratypes (2 males, 1 female) in the author's collection (MWH).

Diagnosis.—*Jellisonia breviloba barrerae* is most similar to *J. b. breviloba*, *J. hayesi*, and *J. maxwelli* n. sp. (described below). Males are distinguished from those of *J. b. breviloba* and *J. hayesi* by the presence of one or two setae on sternum VIII (Fig. 16A) (setae rare in *J. b. breviloba* and *J. hayesi*) and from *J. maxwelli* by the spiculate, elongate, intersegmental membrane (vestigial in *J. maxwelli*, Fig. 17B). The apex of the median dorsal lobe and shape of Ford's sclerite are also diagnostic for *J. b. barrerae* (Fig. 5A). Female: Among females bearing three setae on each side of sternites IV–VI and having a rather straight bursa copulatrix (not sigmoid-shaped), *J. b. barrerae* is inseparable from the nominate subspecies and *J. maxwelli*; however, it may be separated readily from *J. painteri* and *J. hayesi* by the absence of a distinct lobe subtended by a sinus in the caudal margin of sternum VII (Fig. 19A, 19C–D).

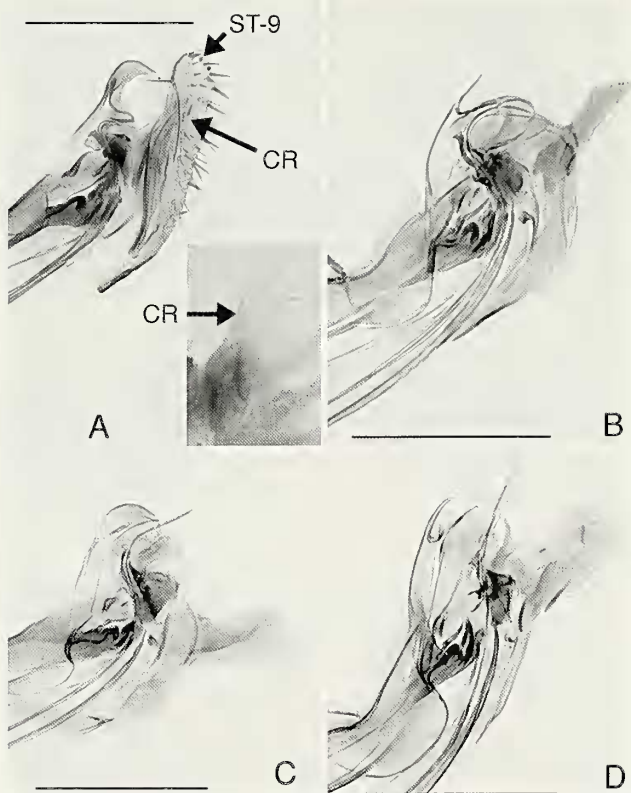


Fig. 7.—Apices of aedeagi in *Jellisonia* species: A, *J. tiptoni* (ST-9=sternum IX, enlargement of CR=crochet); B, *J. bullisi*; C, *J. grayi*; D, *J. ironsi*. (Scale = 200μ).

Description.—**Head.** Preantennal rows with 6, 4, 1 and 3 setae in male; 6, 4, and 3 setae in female. Postantennal rows with 3, 6, and 8 setae on each side; 3, 5, and 6 setae in female. Two setae on each side below oral angle. Fringe of small setae distributed along dorsal margin of antennal fossa. Apical segment of maxillary palpus more than twice length of middle three segments, extending to apex of procoxa. **Thorax.** Pronotum with single row of 7 setae on each side. Mesonotum with 5 setae on each side in main row; mesonotal collar with 4 pseudosetae on each side. Metanotum with 5 setae on each side in main row; 1 marginal spinelet on each side. Metepisternum with 1 long seta. **Legs.** Dorsal margin of each tibia with robust row of setae forming a comb, single lateral row of small setae, mesal row of small setae. **Unmodified Abdominal Segments.** Marginal spinelets on tergites I–IV of male (1, 2, 1, and 1 on each side) and tergites I–III of female (1, 1, and 1 on each side). Male with three antesensorial bristles, lateral and mesal minute, middle large, and borne on sclerotized protuberance; female with three antesensorial bristles, mesal and lateral less than one half length of middle bristle. Female with three setae on each side of sternites III–VI. **Modified Abdominal Segments, male.** Tergum VIII with dorsal fringe of 4–5 setae, dorsolateral group of two setae, ventrolateral group of two setae. Basimere elongate, narrowing towards acetabulum. P1 finger-like; apex at same level as apex of telomere. Telomere with six marginal setae, three spiniform setae grouped at ventrocaudal margin; most ventral much thicker than two adjacent setae. Dorsal setae are slender, not spiniform (Fig. 9A). Apodeme of tergum IX strongly projected cephalad, acutely pointed. Manubrium thick with apex curved upward. Sternum VIII pencil-like; adorned with a single seta on each side; apex with short, forked, membranous extensions less than length of sternite. Intersegmental membrane between sternites VIII and IX spiculate with caudally projected dual plumose extensions (Fig. 16A). Lacking bulbous spiculated intersegmental membrane present in *J. klotsi* (Fig.

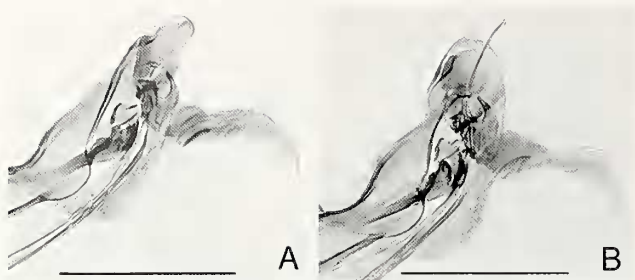


Fig. 8.—Apices of aedeagi in *Jellisonia* species: A, *J. mexicana*; B, *J. wisemani*. (Scale = 200 μ).

17A). Distal arm of sternum IX strongly oblique from ventral inverse seta to apex, anterior margin markedly convex; marked sclerotized protrusion near proximal point of flexure (Fig. 13A). **Aedeagus.** Penis rods just exceeding apex of aedeagal apodeme. Aedeagal apodeme with dorsally expanded hump anterior to narrow neck; hump with vertical sulcus. Dorsal armature heavily sclerotized. Ford's sclerite thickened on caudal margin. Crochet flask-shaped at base, elongate, sharply pointed at apex; apex with tubercles. Paxillus present (Fig. 3A, 5A). **Modified Abdominal Segments, female.** Tergum VIII with 3–5 setae on each side between sensillar plate and tergum VII; dorsal lateral patch of 2–3 setae; ventrolateral patch of 2–3 setae. Caudal margin of sternum VII undulate, without distinct lobes or sinuses; row of 4 lateral setae on each side. Sternum VIII without setae. Bursa copulatrix shorter than length of spermatheca.

Dimensions (slide-mounted specimens).—Average length of males, 2.4 mm, range: 2.2–2.6 mm (n=12). Average

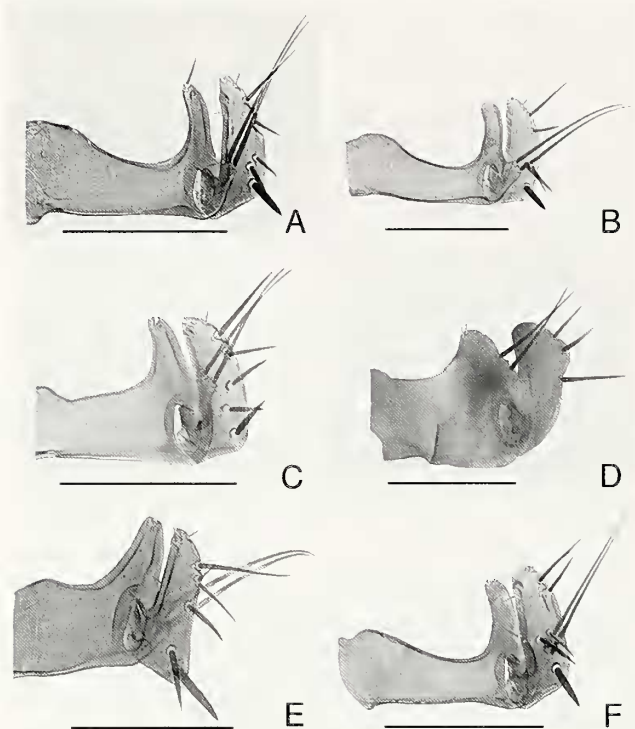


Fig. 9.—Male terga IX of *Jellisonia* species: A, *J. breviloba barrerai*, n. ssp., lateral view; B, *J. b. breviloba*, lateral view; C, *J. eckerlini*, n. sp., lateral view; D, *J. falcata*, lateral view; E, *J. guerrerensis*, mesal view; F, *J. hayesi*, mesal view. (Scale = 200 μ).

length of females, 2.6 mm, range: 2.2–2.9 mm (n=12).

Etymology.—The late Dr. Alfredo Barrera's contributions to our understanding of the flea fauna of Mexico is unparalleled and it is fitting that this new subspecies be named in his honor.

Remarks.—This population of the *J. breviloba* complex has a restricted distribution relative to the nominate subspecies. It may prefer *P. difficilis* as a host, as 38 of 44 specimens (86%) were recorded from that host species. In contrast, of the 24 sympatric specimens of *J. b. breviloba* collected from the Distrito Federal, none were from *P. difficilis* (although one female was from an unspecified species of *Peromyscus*).

Specimens from the states of Morelos and Puebla were conspecific. It should be noted that the anterior margin of the distal arm of sternum IX of males from the Distrito Federal were much more convex than those from Morelos and Puebla, but were similar in other details of the modified segments.

Jellisonia (Jellisonia) eckerlini, new species (Fig. 3C, 5C, 9C, 13C, 16C, 18A, 22A, 25B)

Type Material.—**COSTA RICA.** Alajuela: San Jose (farm of Juan Rafael Cabezz), 1 male, 1 female. Cartago: "13 km from end of road at crater," Mount Irazu (~9°58'N 83°51'W), 2590 m, ex *Peromyscus* sp., 26 July 1962, J.T. Creighton, male holotype and 1 male paratype (CMNH); allotype female, same data as holotype except ex *Reithrodontomys* sp., 23 June 1962 (CMNH); the following paratypes with same locality/collector data as holotype but different hosts and collection dates: ex *Reithrodontomys* sp., 26 July 1962, 1 male (CMNH); 23 June/28 July 1962, 2 females (CMNH). ex *Peromyscus* sp., 25 June/16 July 1962, 2 females (CMNH), ex *Scotinomys* sp., 26, 28 July 1962, 3 males, and 3140 m, ex *Reithrodontomys* sp., 22 June 1962, 3 males (CMNH). **Puntarenas:** Cerro Amigos, 1740 m, *Reithrodontomys creper* Bangs, 1902, 7 May 1989, R.M. Timm, 1 male, 1 female (REL). 11 May 1989, R.M. Timm, 1 male (REL); S. teguina, 6 May 1989, R.M. Timm, 1 male (REL); Monteverde Cloud Forest Reserve, 1508 m, ex *Oryzomys albigularis* Tomes, 1860, 14 May 1989, R.M. Timm, 1 female (REL); 1580 m, ex *S. teguina*, 17 May 1989, R.M. Timm, 1 male (REL); Monteverde, 1580 m, ex *Peromyscus nudipes* [= *Peromyscus mexicanus* (Saussure 1860)], 30 April 1986, J.S. Ash and R.M. Timm, 1 female (CMNH); 1790 m, ex *Scotinomys* sp., 12 May 1986, J.S. Ash and R.M. Timm, 1 male (CMNH). **San José:** 20 km N San Isidro de General (Pan American Highway), ex *Oryzomys* sp., 1 male (CMNH); 14.5 km N San Isidro de General (Pan American Highway), ex *Oryzomys* sp., 1 female (CMNH); 22.3 km N San Isidro, Cerro Buenavista, ex *Peromyscus* sp., 2 males, 4 females (CMNH); 13 km S Empalme, 2439 m, ex *Peromyscus mexicanus nudipes* [= *P. mexicanus*], 1 male, 1 female (RPE); 14 km SE Empalme, 2500 m, ex *Reithrodontomys* sp., 1 female (RPE); Cerro de la Muerte, 3355 m, ex *P. m. nudipes* [= *P. mexicanus*], 1 male (RPE). Holotype, allotype, and 18 paratypes (8 males, 9 females) deposited in CMNH, three paratypes (2 males, 1 female) in USNM, six paratypes (4 males, 2 females) in REL, four paratypes (3 males, 2 females) in RPE, and two paratypes (2 males, 1 female) in the author's collection (MWH).

Diagnosis.—Male: *Jellisonia eckerlini* may be distinguished from all species in which the crochet is not flask-shaped basally (Fig. 5C), except *J. johnsonae*, by projection of the apex of sternum IX which is bent caudad like a hockey stick (Fig. 13C). It may be separated from *J. johnsonae* by the rounded apical sclerite of the median

dorsal lobe (acutely pointed in *J. johnsonae*) (Fig. 5C, 6A). The posterior margin of the telomere is also convex in *J. eckerlini* and nearly straight in *J. johnsonae* (Fig. 9C, 10A). Females are distinguished from those of other species except *J. johnsonae*, *J. klotsi*, *J. painteri*, and *J. guerrensis* by the absence of a sigmoid-curved bursa copulatrix and the presence of only two setae on each side of sternites IV–VI. The presence of a distinct dorsal lobe on the caudal margin of sternum VII separates *J. eckerlini* (Fig. 18A) from *J. johnsonae* (lobe only indicated, or lacking entirely). The new species differs from *J. klotsi*, *J. painteri*, and *J. guerrensis* by the depth of the sinus on the caudal margin of sternum VII, which is less than the width of dorsal lobe (measured from the greatest depth of the sinus to the closest margin of the dorsal lobe). The deeper sinus in the three species is a reflection of the larger dorsal lobe.

Description.—**Head.** Preantennal area with 3 rows of setae in male (7–8, 4, and 3 on each side); female (5–6, 4, and 3 on each side). Three rows of setae in postantennal area of male (3, 6, and 5 on each side); female (3, 5, and 6 on each side). Female with single long seta behind lowest bristle of main postantennal row. Middle three segments of labial palpus each about half the length of apical segment. Apical segment not extending to apex of coxa. Two setae below oral angle. **Thorax.** Seven setae on each side in single row of pronotum. Nine to 10 spines on each side in pronotal comb. Five setae on each side in main row of mesonotum; 4–5 pseudosetae on each side under mesonotal collar. Six setae on each side in main row of metanotum; each side with single apical spinelet. **Legs.** Mesofemora and metafemora with no lateral setae, a single minute seta on mesal surface. Mesotibiae and Metatibiae with single row of setae on mesal and lateral surfaces; each with false combs on dorsal margins. **Unmodified Abdominal Segments.** Marginal spinelets on tergites I–IV of male (1, 2, 1, and 1 on each side); female tergites I–III (1, 1, and 1 on each side). Female sternum III (3 setae on each side) and sternites IV–VI (2 setae on each side). **Modified Abdominal Segments, male.** Basimere narrowed, extended caudad with P1 and telomere of equal height. Telomere with 5 spiniform setae; two dorsal setae marginal, three ventral setae submarginal. Patch of 12 minute setae on ventrolateral surface of telomere. Pair of acetabular bristles on acetabular projection; dorsal to top of acetabulum (Fig. 9C). Tergum VIII large with dorsolateral and ventrolateral pairs of long setae (both groups of setae are variable); dorsal margin fringed with 3–4 long setae. Sternum VIII vestigial with indication of spiculated intersegmental membrane between sternites VIII and IX (Fig. 16C). Sternum IX shaped like hockey stick with apex markedly bent caudad. Ventral inverse setae set well back from anterior margin of sternum IX. Point of flexure of sternum IX about $\frac{1}{4}$ the distance from juncture of proximal and distal arms to apex of distal arm (Fig. 13C). **Aedeagus.** Aedeagal apodeme without dorsal hump distad to neck. Smooth curved margin of dorsal median lobe distinctly thickened, fused with Ford's sclerite, bluntly rounded at apex. Distal end of lateral lobes membranous, difficult to visualize; anteroventral portion of lateral lobes more sclerotized. Crescent sclerite stubby, thickened in middle. Crochet linear, not flask-shaped at base; caudally directed portion short, apex blunt, studded with tubercles (Fig. 3C, 5C). **Modified Abdominal Segments, female.** Tergum VIII with row of 5 setae on each side near spiracle VIII, dorsolateral group of 2–4 setae; ventrolateral group of 1–2 setae; marginal row of 4 long and 2 short setae; pair of short submarginal setae. Sternum VII with small lobe subtended by shallow sinus, 4–5 lateral setae (Fig. 18A). Sternum VIII without setae. Ventral anal lobe angled, ventrocaudal margin with 3 spiniform setae and 2 slender setae at apex. Bursa cop-

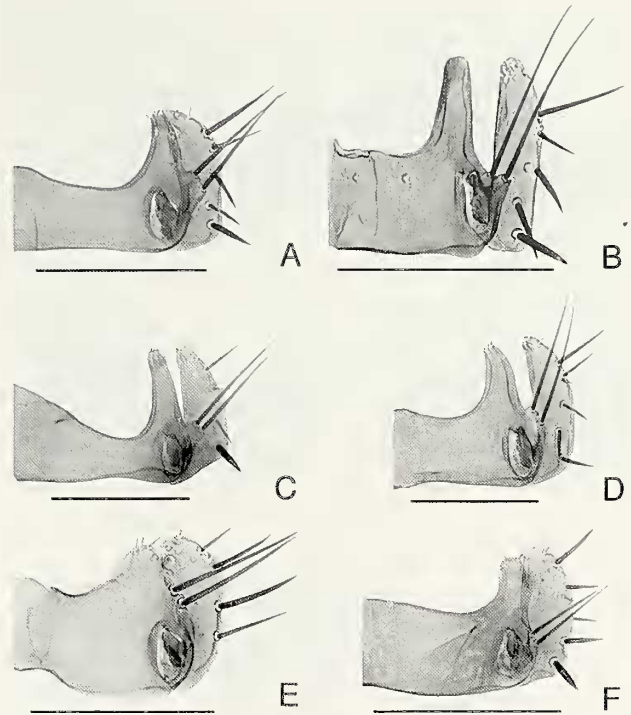


Fig. 10.—Male terga IX of *Jellisonia* species, lateral view: A, *J. johnsonae*; B, *J. klotsi*; C, *J. maxwelli*, n. sp.; D, *J. painteri*; E, *J. tiptoni*; F, *J. amadoi*. (Scale = 200 μ).

ulatrix shorter than length of spermatheca; perula reflexed caudad (Fig. 22A).

Dimensions (slide mounted specimens).—Average length of males, 1.8 mm, range: 1.7–2.1 mm ($n=13$). Average length of females, 2.4 mm, range: 2.1–2.6 mm ($n=8$).

Etymology.—This species is named in honor of my friend and colleague, Ralph P. Eckerlin, Northern Virginia Community College, Annandale, Virginia, who has collected fleas extensively in Central America and generously made some of them available for this study.

Remarks.—*Jellisonia eckerlini*, collected at high elevations in the Costa Rican cloud forests of the Cordillera de Talamanca, Cordillera Central, and the Cordillera de Tilarán, has close affinities with *J. johnsonae*. The type locality of *J. johnsonae* is 180 km from the most southeastern record of *J. eckerlini*; however, a few records of *J. johnsonae* are sympatric with the more northern records of *J. eckerlini* in Costa Rica (Fig. 25B). Tipton and Méndez (1966) listed two females from Bocas del Toro and Los Santos Provinces, Panama, and indicated that the dorsal lobe of sternum VII of each was more pronounced than the only species they found in their study (*J. johnsonae*). Although their material could not be located, the pronounced dorsal lobe suggests they might represent *J. eckerlini*, which would tentatively extend the distribution of this new species further south.

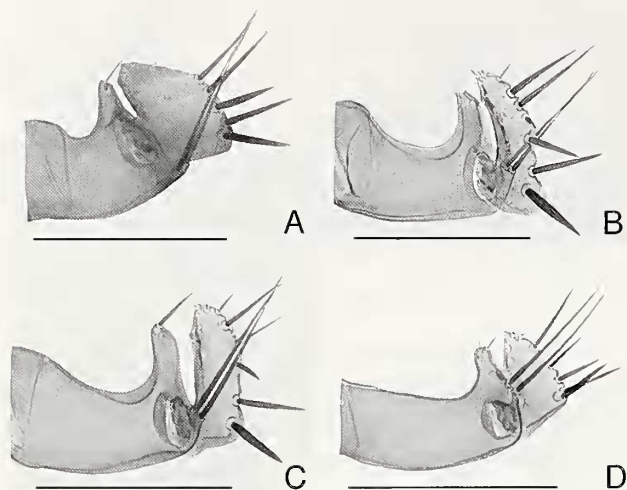


Fig. 11.—Male terga IX of *Jellisonia* species, lateral views: A, *J. bullisi*; B, *J. grayi*; C, *J. ironsi*; D, *J. mexicana*. (Scale = 200 μ).

Jellisonia (*Jellisonia*) *falcata* (Méndez and Hanssen 1975), **new combination**
(Fig. 3D, 5D, 9D, 18B, 21D, 25A)

Kohlsia falcata Méndez and Hanssen. 1975. Proceedings of the Entomological Society of Washington, 77:91–96.

Type Material.—**COLOMBIA**. *Meta*: Hacienda “La Conquista,” 70 km N Puerto López, 642 m, ex *Tamandua tetradactyla* (Linn., 1758), July 1971, H. Hanssen (holotype male/allotype female) (USNM No. 73330).

Diagnosis.—Male: *Jellisonia falcata* differs from all other taxa except *J. tiptoni* by the division of the median dorsal lobe into a hook-like dorsal lobe and a secondary ventral lobe, the telomere is broader beyond the middle than at the base, and numerous spiniform setae adorn the distal arm of sternum IX (Fig. 5D, 7A, 9D). There are three marginal setae on the telomere of *J. tiptoni* compared to four on that of *J. falcata* (Fig. 9D, 10E). Females differ from those of *J. tiptoni* by a rounded ventral lobe on sternum VII (acutely sharp in *J. tiptoni*) and from all others by the bursa copulatrix that is sigmoid-shaped and much longer than the spermatheca (Fig. 20A, 21D).

Material Examined.—Holotype and allotype.

Remarks.—This species is transferred from the genus *Kohlsia* to *Jellisonia* based on the following characters unique to *Jellisonia* (*Jellisonia*): 1) the presence of false combs on the mesotibiae and metatibiae; 2) the presence of ventral and dorsal inverse setae on the distal arm of sternum IX; 3) the vestigial nature of sternum VIII; 4) the characteristic crochets with tuberculate structures on the apex; 5) lack of a strong (near 90 degrees) anterior flexure of the apex of the bursa copulatrix; and 6) bulga of spermatheca is longer than wide. Méndez and Hanssen (1975) considered *K. fal-*

cata and *K. tiptoni* to be similar species but set apart from all other *Kohlsia* species and with close affinities to *Jellisonia*.

This species is known only from the two males and one female collected from the collared anteater, *T. tetradactyla*. The collared anteater is undoubtedly an accidental host species. This small anteater is largely arboreal, often frequenting the ground and dwelling in earthen or hollow tree cavities previously occupied by other mammals. The opportunity for immature stages of the flea to develop as a result of this host's habits is highly unlikely. Species in this mammalian genus are not known to harbor any host-specific flea species. Although Méndez and Hanssen (1975) suggested an arboreal host, the natural host animal may prove to be a ground-dwelling sigmodontid rodent similar to that of other *Jellisonia* species. The median dorsal lobe of *J. falcata* and *J. tiptoni* is divided into a dorsal falcate lobe and a ventral bluntly rounded lobe. The dorsal falcate lobe was termed the primary median dorsal lobe by Traub (1950) and referenced as such by Méndez and Hanssen (1975). Traub (1950) further defined the more ventral lobe of the median dorsal lobe as the secondary or paradorsal lobe of the aedeagus. These are similar in *J. tiptoni* and have affinities to some species of *Kohlsia*. It should be pointed out that *J. ironsi* and *J. bullisi* also possess these seemingly homologous structures, although they are placed in a different subgenus within this work. Traub (1950) suggested that these structures in the latter two species contribute to a bifurcate aedeagus. Similarities in these four species also include a sclerotized inner tube that is strongly reflexed anteriorly, more so than in other species within the genus *Jellisonia* (a characteristic of *Kohlsia*). *Kohlsia* may ultimately prove to be subordinate to *Jellisonia*.

Jellisonia (*Jellisonia*) *guerrerensis* Morales, 1990
(Fig. 3E, 5E, 9E, 13D, 16D, 18J–L, 24B)

Jellisonia guerrensis Morales. 1990. The Southwestern Naturalist, 35:310–315. Ponce-Ulloa and Llorente-Bousquets, 1996:558, 564.

Type Material.—**MÉXICO**. *Guerrero*: Agua Fria, 22 km SW Yextla, 2600 m, ex *Peromyscus megalops auritus* [= *P. megalops* Merriam, 1898], 11 April 1963, T. Alvarez (holotype male/allotype female) (UNAM).

Diagnosis.—Males of *J. guerrensis* are associated with those taxa that do not have a bifurcate (divided) median dorsal lobe and lack a loop-like sclerotization intruding inward at the anterodorsal margin of the median dorsal lobe. Included among these are *J. johnsonae*, *J. eckerlini*, *J. painteri*, and *J. klotsi*. Males of *J. guerrensis* are distinct from the former two species by the lack of a caudal projection at the apex of distal arm of sternum IX (Fig. 13C, 14C). *Jellisonia painteri* lacks a concavity in the ventral margin of distal arm of sternum IX, present in *J. klotsi* and *J. guerren-*

sis (Fig. 14A, C). The ventral caudal lobe of the telomere in *J. guerrerensis* is much more pronounced than that of *J. klotzi* (Fig. 9E, 10B). Female: The bursa copulatrix is not sigmoid shaped and is similar to those species possessing only two setae on each side of sternites IV–VI. Among these, *J. johnsonae* has no sinus in the caudal margin of sternum VII, *J. eckerlini* has a very broad sinus, and *J. klotzi*, *J. painteri*, and *J. guerrerensis* each have a deep sinus (Fig. 18A, 18C–L, 19B, 19D). The latter two taxa are indistinguishable and the separation of *J. klotzi* is uncertain without accompanying males and consideration of geographic locality.

Material Examined.—**MÉXICO.** Chiapas: 17 km NW Teopisca, 1982 m, ex *Peromyscus mexicanus guatemalensis* [= *P. guatemalensis* Merriam, 1898], 1 female (UNAM). Guanajuato: Puerto del Gallo, ex *Oryzomys* sp., 1 male (UNAM). Guerrero: Agua Fria, 22 km SW Yexthla, 2600 m, ex *P. m. auritus* [= *P. megalops*], male holotype, female allotype and 1 female paratype (UNAM); 1.6 km NW Omiltemi, ex *Peromyscus* sp., 1 male paratype (UNAM); Omiltemi, ex *Peromyscus* sp., 3 male paratypes (UNAM); ex *Reithrodontomys* sp., 1 male paratype (UNAM); Puerto Chico, Xochipala, 2600 m, ex *P. m. auritus* [= *P. megalops*], 2 paratypes (1 male, 1 female) (UNAM); Omiltemi, ex *Reithrodontomys* sp., 1 male (UNAM); Chilpancingo, 2.5 km E Omiltemi, ex *P. megalops*, 1 male (UNAM); ex *Megadontomys thomasi* (Merriam 1898), 1 male (UNAM); 4 km N Omiltemi, ex *P. megalops*, 1 male (UNAM); ex *M. thomasi*, 1 female (UNAM); 1.6 km SW Omiltemi, 2012–2213, ex *Peromyscus* sp., 11 males, 2 females (CMNH); 2213 m, ex *Reithrodontomys* sp., 2 males (CMNH); Omiltemi, ex *Peromyscus* sp., 1 male (CMNH); Camotla, Leonardo Bravo, ex *Peromyscus banderanus vicinior* [= *P. banderanus*], 1 male (CMNH). Oaxaca: Tlahuitoltepec, near Santa María Yacochi, 2300–2400 m, ex *Habromys lepturus* (Merriam 1898), 3 males, 1 female, ex *Oryzomys chapmani* Thomas, 1898, 1 female, *P. aztecus*, 1 female, ex *Peromyscus melanocarpus* Osgood, 1904, 2 females (MWH); 7 km SW Suchixtepec, ex *Reithrodontomys* sp., 1 male, ex *Peromyscus* sp., 2 males, 1 female (CMNH); 16 km SW Suchixtepec, ex *Peromyscus* sp., 2 males, 1 female (CMNH); Llano las Flores, 87 km N Oaxaca, ex *Microtus* sp., 1 male, 1 female (CMNH); 1 male, ex *Microtus* nest, 8 males, 12 females, ex *Peromyscus* nest, 1 male, 1 female (CNC). Veracruz: La Joya, ex *Peromyscus* sp., 1 male (CMNH).

Remarks.—Other than “n. sp.” penciled on each slide, the type material received from UNAM had no type designations marked on the slides. Fortunately, it was possible to precisely match the holotype, allotype, and seven of the remaining eight paratypes by comparing the host/locality data in Morales (1990) with data recorded on each of the slides. The last specimen recorded under “Type Data” by Morales (1990) may or may not have been examined in this revision. This slide had the exact data (including “n. sp.” marked on the label in pencil) except for the date: 3 September 1962 versus 2 April 1963. This specimen may represent the last specimen listed by Morales but if so, the date was erroneously recorded under his “Type Data” or on the slide examined.

The ventrocaudal angle of the telomere of *J. guerrerensis* is the most pronounced of all *Jellisonia* and the degree of sclerotization is also remarkable. The dorsal lobe of sternum VII of the female is correspondingly large, perhaps a correlation with that of the robust telomere. Although the obscure locality from Veracruz could not be precisely located, it is likely in the southern portion of the state in the mountainous areas associated with Oaxaca. Veracruz is the most eastern limit of the species.

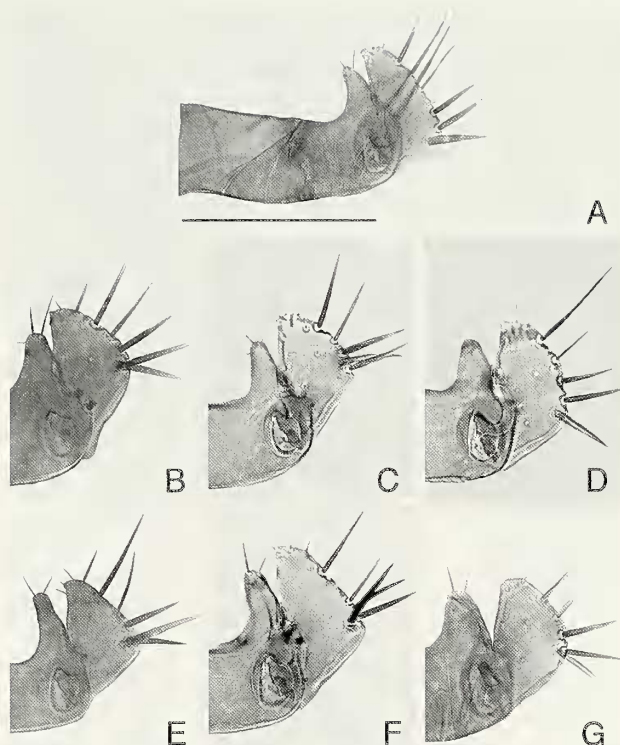


Fig. 12.—Male terga IX of *Jellisonia wisemani*, both antesensorial bristles removed: A, Holotype, *J. wisemani*, Jalisco, México; B, Holotype, *J. bonia*, Veracruz, México (= *J. wisemani*); C, Veracruz, México; D, Jalisco, México; E, Oaxaca, México; F, Chiapas, México; G, Chiquimula, Guatemala. (Scale = 200 μ).

Jellisonia (Jellisonia) hayesi Traub, 1950
(Fig. 3F, 5F, 9F, 13E, 16E, 19A, 22B, 24A)

Jellisonia hayesi hayesi Traub, 1950. Fieldiana: Zoology Memoirs, 1:17–19.

Ayala-Barajas et al., 1988:67–68; Ponce-Ulloa and Llorente-Bousquets, 1996:558.

Jellisonia hayesi Traub: Barrera; 1958:92.

Type Material.—**MÉXICO.** Michoacán: Mount San Miguel, 1982 m, ex *P. hylocetes* [= *P. aztecus*], 30 July 1941, R. Traub, (holotype male/allotype female) (FMNH).

Diagnosis.—Males of *J. hayesi* are distinguished from all species except *J. maxwelli* by the presence of each of the following characters: PI narrow and finger-like (not broad), median dorsal lobe without a ventral secondary lobe; crochet with a round flask-shaped base (Fig. 5F); and a small lobe on the distal arm of sternum IX anterior to and at the same level as the ventral inverse seta (Fig. 14B). The distal arm of sternum IX differs from that of *J. maxwelli* by the presence of a lobe on the ventral margin and it is rounded at the apex (Fig. 13E). Female: Unlike *J. tiptoni*, the ventral lobe of sternum VII is broadly convex and differs from *J. falcata* by the bursa copulatrix which is subequal in length to the spermatheca and not sigmoid-shaped. It is similar to the two subspecies of *J. breviloba*, *J. maxwelli*, and *J. painteri*. Each has three

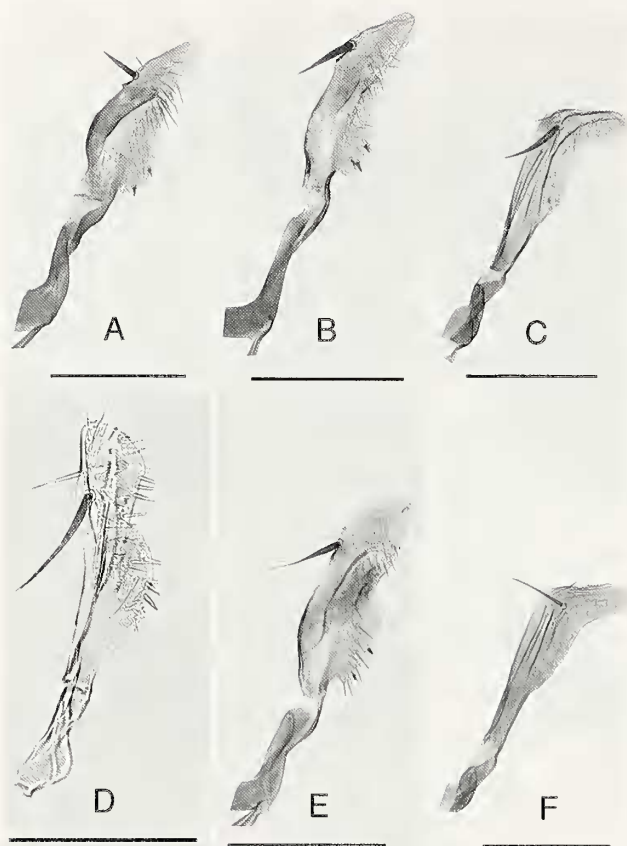


Fig. 13.—Distal arm of male sternum IX in *Jellisonia* species (proximal arm removed): A, *J. b. barrerai*, n. ssp.; B, *J. b. breviloba*; C, *J. eckerlini*, n. sp.; D, *J. guerrerensis*; E, *J. hayesi*; F, *J. johnsonae*. (Scale = 200 μ).

setae on each side of sternites IV–VI (some *J. painteri* have only two). *Jellisonia hayesi* and *J. painteri* each have a large dorsal lobe and subtending sinus on sternum VII, which is absent in the former three species. In *J. hayesi*, the perula of the bursa copulatrix is not reflected caudad as it is in *J. painteri*.

Material Examined.—**MÉXICO.** **Guerrero:** 1.6 km NW Omiltemi, 2213 m, ex *Peromyscus megalops*?, 1 male (CMNH); 1.6 km SW Omiltemi, 2213–2226 m, ex *Peromyscus* sp., 5 males, 1 female (CMNH); 4.8 km E Omiltemi, 1912 m, ex *Peromyscus* sp., 3 males (CMNH); Camotla, Leonardo Bravo, ex *P. truei gratus* [= *P. gratus*], 1 male, 2 females (CMNH); Omiltemi, ex *Peromyscus* sp., 1 male (CMNH), ex *Liomys* sp., 1 male (CMNH); Chilpancingo, Omiltemi, ex *Peromyscus levipes* Merriam, 1898, 2 males, 1 female, ex *M. thomasi*, 1 male (UNAM); Chichihualco, Camotla, Leonardo Bravo, ex *P. truei* [= *P. gratus*], 1 female (UNAM). **Jalisco:** 1 km S, 19 km W Ciudad Guzmán, 2420 m, ex *Peromyscus* sp., 1 male (CMNH); Nevado de Colima, 2165–3720 m, ex *P. hylocetes* [= *P. aztecus*], 10 males, 8 females (CMNH), 2165 m, ex *Neotoma* sp., 2 males, 3 females (CMNH), 2440 m, ex *Peromyscus* sp., 1 male (CMNH), and 3354 m, ex *Peromyscus* sp., 1 female (CMNH). **Michoacán:** Tancitaro, San Miguel, 1982 m, ex *P. hylocetes* [= *P. aztecus*], holotype, allotype (FMNH) and paratype (1 male) (CMNH); and 10 km S (by road) Pátzcuaro (19°27'35"N, 101°36'27"W), 2200 m, ex *Peromyscus* sp., 1 female (MWH), ex *Baiomys musculus* Merriam, 1892, 1 female (MWH).

Remarks.—Since the original descriptions of *J. h. hayesi* and *J. h. breviloba*, subsequent collecting has increased the number of known specimens and greatly expanded the distribution of these closely allied taxa. The additional material has enabled a more definitive examination of these previously described subspecies. The structure of the telomere and sternum IX demonstrate the basic differences in *J. hayesi* and the subspecies of *J. breviloba*. In *J. hayesi*, the apex of the telomere is blunt rather than pointed (Fig. 9A–B, 9F) and the apex of the distal arm of sternum IX is gently rounded instead of straight from the ventral inverse seta to the apex (Fig. 13A–B, 13E). *Jellisonia hayesi breviloba* is herein elevated to a full species rendering the subspecific status of *J. hayesi* irrelevant. Populations of *J. hayesi* are restricted to the western part of central Mexico at high elevations in Jalisco, Michoacán, and Guerrero, while populations of *J. b. breviloba* are much more widely distributed from northern Veracruz to Morelos, north to southern Sinaloa, Coahuila, and Nuevo León. The two species are allopatric except for several specimens of *J. b. breviloba* occurring in Jalisco (1 male, 1 female) and Guerrero (3 males, 6 females). In these sympatric zones, no intergrades of *J. b. breviloba* and *J. hayesi* have been found.

Variations in several structures were noted in Omiltemi populations from the state of Guerrero. Males do not have an enlarged dorsal hump bearing a short vertical suture on the aedeagal apodeme and the ventrocaudal lobe of the distal arm of sternum IX is less prominent than populations from other states. The Guerrero populations are otherwise conspecific.

Jellisonia (Jellisonia) johnsonae Tipton and Méndez, 1966

(Fig. 3G, 6A, 10A, 13F, 16F, 19B, 22C, 25B)

Jellisonia johnsonae Tipton and Méndez. 1961. Annals of the Entomological Society of America, 54:259–262, pls. 3, 4. Tipton and Méndez, 1966:310.

Type Material.—**PANAMÁ.** **Chiriquí:** Cerro Punta, below Casa Pitty, 1829 m, ex *S. teguina*, 31 January 1960, Keenan and Tipton (holotype male, USNM No. 66653, and allotype female) (USNM).

Diagnosis.—Males of *J. johnsonae* are distinguished from other species except *J. eckerlini* by a combination of the median dorsal lobe lacking a secondary ventral lobe or a loop-like sclerotized intrusion, crochet linear opposed to flask-like (Fig. 6A), and the apex of the distal arm of sternum IX abruptly turned caudad like a hockey stick (Fig. 13F). The apical sclerite of the median dorsal lobe is acutely pointed in *J. johnsonae* (Fig. 6A) and bluntly rounded in *J. eckerlini* (Fig. 5C). Females are similar to other taxa lacking a sinus on the caudal margin of sternum IX but two setae on each side of sternites IV–VI distinguishes *J. johnsonae* from those (Fig. 19B).

Material Examined.—**COSTA RICA.** **Alajuela:** Monteverde Cloud Forest Reserve, 1669 m, ex *P. nudipes* [= *P. mexicanus*], 16 May 1989,

R.M. Timm, 1 female (REL), 1580 m, ex *S. teguina*, 17 May 1989, R.M. Timm, 1 female (REL); 7.4 km S Café la Georgiana, Pan American Highway, ex *Peromyscus* sp., 1 female (CMNH). **San José:** 14 km SE Empalme, 2500 m, ex *P. nudipes* [= *P. mexicanus*], 2 males (RPE); 10 km S Empalme, 2561 m, ex *P. mexicanus*, 1 male, 1 female (RPE).

PANAMÁ. Chiriquí: Bambito, 1524–1768 m, ex “animal nest,” 1 male paratype (BYU), 2 male paratypes (CMNH), ex *P. nudipes* [= *P. mexicanus*], 3 male paratypes, female allotype (USNM), ex *Reithrodontomys mexicanus* (Saussure 1860), 1 female paratype (CMNH), ex *Reithrodontomys sumichrasti* (Saussure 1861), 1 female paratype (CMNH), 2 male, 4 female paratypes (USNM), *S. teguina*, 1 female paratype (BYU), 1 male, 1 female paratypes (USNM); Cerro Barú Cratere, ex *R. sumichrasti*, 1 female paratype (GML); Cerro Punta, 1829–2073 m, *S. teguina*, male holotype, 1 male, 2 female paratypes (USNM), 1 female paratype (BYU), ex *P. nudipes* [= *P. mexicanus*], 1 male paratype (CMNH); Bambito-Cerro Punta, 1524–2134 m, ex *P. nudipes* [= *P. mexicanus*], 1 male (BYU), ex *Reithrodontomys* sp., 1 male (BYU), ex *R. creper*, 1 male (USNM), *R. sumichrasti*, 1 female paratype (BYU), ex *Scotinomys xerampelinus* (Bangs 1902), 1 male (USNM), 1 male, ex *S. teguina*, 3 females (1 paratype) (BMNH), 1 male, 1 female paratypes (BYU), 1 male, 1 female paratypes (CMNH), 1 male paratype (GML), 1 male, 5 female paratypes, 2 male, 3 female (USNM); Lava flow Volcán, *S. teguina*, 1 male (BMNH).

Remarks.—Records of *J. johnsonae* from central Costa Rica are the first reported outside of Panamá. Representatives from Costa Rica are 180 km from records in northern Panama, collected from two of the same host species (*P. mexicanus* and *S. teguina*). This species has been found at 1500–2555 m.

The number of setae in the metatibial comb (below level of last paired setae and excluding the terminal cluster of setae) is rather constant with either four or five single thick setae [five setae on each leg ($n=7$), 4/4 setae ($n=6$), and 4/5 setae ($n=4$)]. One exceptional specimen had four on one side and three on the other. The caudal margin of sternum VII of all females has only a slight indication of a dorsal lobe subtended by a mildly sinuous margin (Fig. 19B). The preferred host (at least in its limited known range) appears to be *S. teguina*.

Jellisonia (Jellisonia) klotsi Traub, 1944

(Fig. 1D, 1G, 3H, 6B, 10B, 14A, 17A, 18C–I, 23B)

Jellisonia klotsi Traub, 1944. Zoological Series of Field Museum of Natural History, 29(15):211–214. Traub, 1950:14–17; Barrera, 1953:215–216; Barrera, 1958:92; Barrera, 1968:71; Ayala-Barajas et al., 1988:69–70; Ponce-Ulloa and Llorente-Bousquets, 1996:558.

Jellisonia dybasi Traub, 1950:19–20. Ponce-Ulloa and Llorente-Bousquets, 1996:558. **New synonymy.**

Type Material.—**MÉXICO. Michoacán:** Cerro Tancitaro, near Tancitaro, ex *Reithrodontomys chrysopsis chrysopsis* = *R. chrysopsis* Merriam, 1900, 12 July 1941, R. Traub (holotype male/allotype female) (FMNH).

Diagnosis.—Male: The characters distinguishing males of *J. klotsi* from other species except *J. painteri* and *J. guerrensis* are the same as those listed below for *J. painteri*. The presence of a deep concavity in the ventral margin of the distal arm of sternum IX characterizes *J. klotsi* and *J. guerrensis* (Fig. 13D, 14A). The lack of a

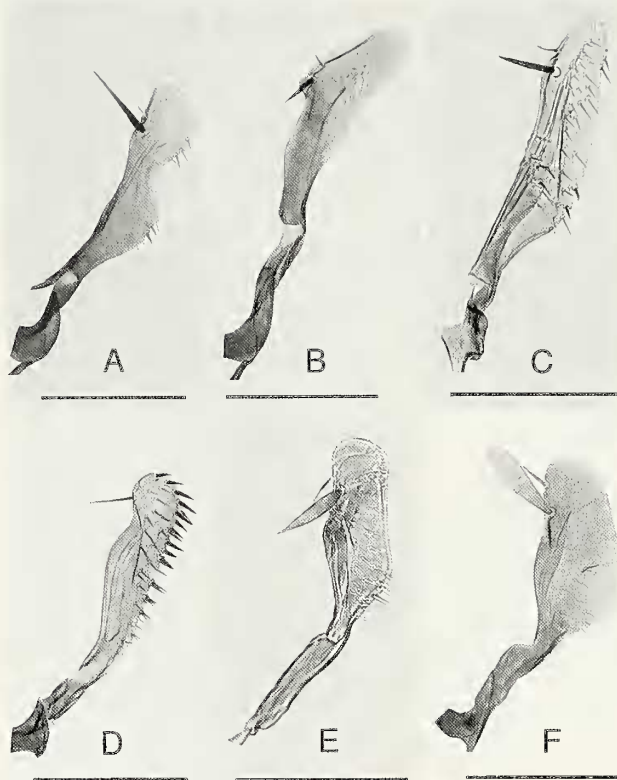


Fig. 14.—Distal arm of male sternum IX in *Jellisonia* species (proximal arm removed): A, *J. klotsi*; B, *J. maxwelli*, n. sp.; C, *J. painteri*; D, *J. tiptoni*; E, *J. bullisi*; F, *J. grayi*. (Scale = 200 μ).

pronounced ventral caudal lobe on the telomere differentiates *J. klotsi* from the latter (Fig. 10B). Female: A deep and narrow sinus in the caudal margin of sternum IX is shared only by females of *J. klotsi* and *J. painteri*. These three species have three setae on each side of sternites IV–VI (some *J. painteri* may have two on each side). Located in Guatemala, females of *J. painteri* with either two or three setae on each side of sternites IV–VI may be separated based on geographical distribution. Without accompanying males, differentiation of *J. klotsi* is uncertain.

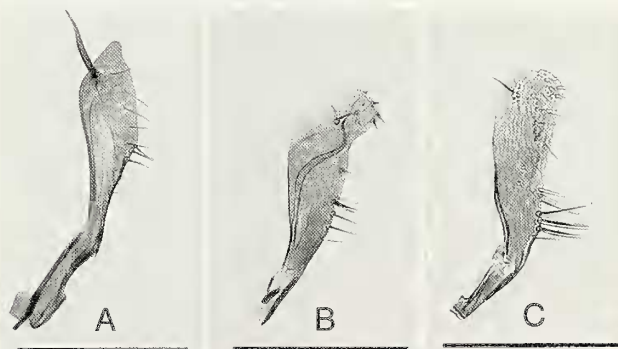


Fig. 15.—Distal arm of male sternum IX in *Jellisonia* species (proximal arm removed): A, *J. ironsi*; B, *J. mexicana*; C, *J. wisemani*. (Scale = 200 μ).

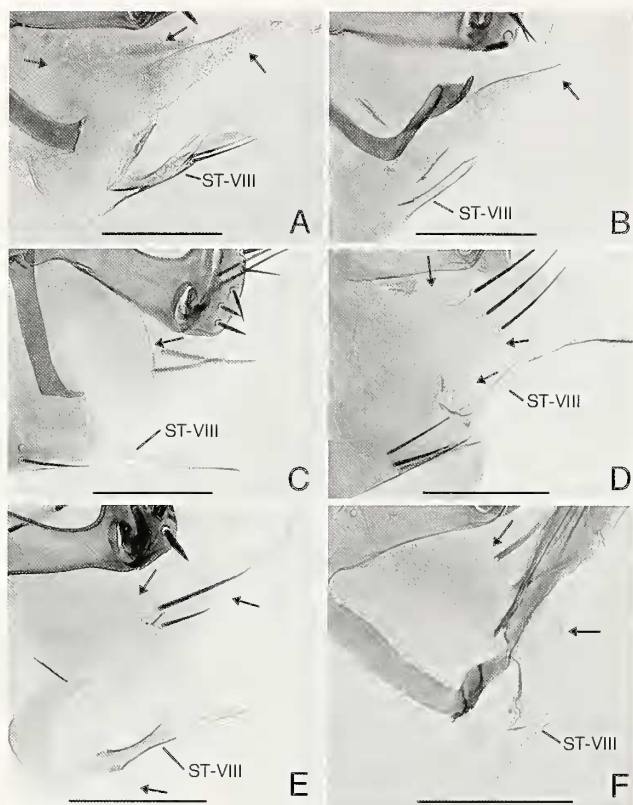


Fig. 16.—Male sternite VIII and intersegmental membranes between sternites VIII (ST-VIII) and IX (black arrows) of *Jellisonia*: A, *J. breviloba barrerae* n. ssp.; B, *J. b. breviloba*; C, *J. eckerlini*, n. sp.; D, *J. guerrensis*; E, *J. hayesi*; F, *J. johnsonae*. (Scale = 200 μ).

tain, but the upper margin of the dorsal lobe of sternum IX tends to be slightly concave in that of *J. klotsi* versus straight to convex in that of *J. guerrensis* (Fig. 18C–I, 18J–K).

Material Examined.—**MÉXICO.** **Distrito Federal:** 42 km N Cuernavaca [Cuernavaca], ex *P. lylocetes* [= *P. aztecus*], 1 female (UNAM); 5 km SW Parres, 3000 m, ex *Reithrodontomys* sp., 2 males, 1 female (UNAM); 3100 m, ex *Neotomodon alstoni alstoni* [= *N. alstoni* Merriam, 1898], 1 female (UNAM); **Jalisco:** Nevado de Colima, 3323–3354 m, ex *P. melanotis*, 2 males, 1 female (UNAM), 3201–3354 m, ex *Microtus* sp., 3 males, 2 females (CMNH), ex *M. mexicanus*, 1 male, 1 female (CMNH), ex *P. lylocetes* [= *P. aztecus*], 1 male (CMNH), ex *P. melanotis*, 5 males, 3 females (CMNH), ex *Peromyscus* sp., 2 males, 3 females (CMNH), ex *Reithrodontomys* sp., 7 males, 6 females (CMNH). **México:** Lagunas de Zempoala, near Ojotongo, 2743–2774 m, ex *P. maniculatus*, 5 males, 1 female (CMNH); 2790 m, ex: *Peromyscus* sp., 3 males, 3 females (CMNH); Río Frio, Llano Grande, 3200 m, ex *N. alstoni*, 2 females (CMNH); 4 km W Río Frio, 3000 m, ex *N. alstoni*, 1 female (CMNH). **Michoacán:** Tancitaro, Mt. Tancitaro, 2380 m, ex *Reithrodontomys* sp., 1 male holotype, 2440 m, 1 female allotype (FMNH), 2380–2440 m, ex *R. c. chrysopsis*, 1 male, 1 female paratypes (BMNH), 1 male paratype, ex *Reithrodontomys* sp., 2 male, 2 female paratypes (CMNH), 2 male, 2 female paratypes (USNM). **Morelos:** Lagunas de Zempoala, near Ojotongo, 2590 m, ex *Reithrodontomys* sp., 1 female (CMNH); Lagunas de Zempoala, near Ojo de Agua, 2287 m, ex *Neotomodon* sp., 1 male (CMNH), ex *P. difficilis*?, 1 male (CMNH). **Puebla:** Popocatepetl, ex *Reithrodontomys* sp., 1 female (UNAM), 3100 m, ex *Reithrodontomys* sp., 1 female (CMNH). **Tlaxcala:** 10 km NE Calpulápan [Calpulápan], 3100 m,

ex *Reithrodontomys* sp., 1 male (UNAM). **Veracruz:** Acajete, ex “rodent nest under rock in field,” 30 July 1941, H. Dybas, (*J. dybasi* female holotype) (FMNH).

Remarks.—The caudal margin of sternum VII has a strong lobe subtended by a deep sinus; however, variation in the caudal margin occurs even within the same population (Fig. 18C–H). These features are indistinguishable from those of *J. dybasi* (Fig. 18I), while the dorsal margin of the lobe of *J. guerrensis* tends to be more convex (Fig. 18J–L).

Jellisonia dybasi was described from one female and no additional specimens have since been reported. Traub (1950) considered *J. dybasi* to have close affinities with *J. klotsi* and reported differences in the shape of the caudal margin of the sternum VII and the number of lateral setae, the number of submedian setae of tergum VIII, the number of setae on the mesepimeron, and relative lengths of mesothoracic tarsal segments I and III. Females of *J. guerrensis* are also similar to those of *J. dybasi* and *J. klotsi*. Series of *J. klotsi* and *J. guerrensis* were studied and the characters listed by Traub proved to be quite variable from the same locality or even from opposite sides of the same flea. For *J. dybasi*, these characters fall within the ranges of these variations. Records of *J. klotsi* are restricted to a narrow zone of 19–20 degrees north latitude from the western Pacific coastal state of Jalisco to the eastern Caribbean coastal state of Veracruz. The distribution of *J. guerrensis* occurs below 18 degrees north latitude. *Jellisonia dybasi* falls within the known distribution of *J. klotsi* and not that of *J. guerrensis*. In addition, the dorsal lobe of sternum VII is narrow, slightly concave dorsally, and the ventral lobe extends beyond the apex of the dorsal lobe in *J. klotsi* and *J. dybasi*. The dorsal lobe of *J. guerrensis* is wider, convex dorsally, and the ventral lobe hardly extends beyond the apex of dorsal lobe. This evidence suggests that *J. dybasi* is a junior synonym of *J. klotsi*, representing an extreme eastern limit of *J. klotsi*.

Jellisonia (Jellisonia) maxwelli, new species
(Fig. 4A, 6C, 10C, 14B, 17B, 19C, 22D, 24B)

Type Material.—**MÉXICO.** Nuevo León: Chipinque (25°55'N, 100°23'W), 1310–1463 m, ex *Peromyscus* sp., 26–27 August 1965, J. O'Keefe and R. Kronmeyer. Holotype male, allotype female, and 5 female paratypes deposited in CMNH.

Diagnosis.—This new species is similar to *J. hayesi* and the two subspecies of *J. breviloba*. Male: The crochet has a round flask-shaped base and the median dorsal lobe has a loop-like sclerotized intrusion on the anterodorsal margin (Fig. 4A, 6C). The most ventral seta of the telomere is especially stout in contrast to the four more dorsal marginals that are slender and not spiniform (Fig. 10C). Two or more of the marginal setae are spiniform in *J. hayesi* and the subspecies of *J. breviloba*. Further distinguished from *J. hayesi* and *J. b. breviloba* by the presence of one

or two setae on sternum VIII (Fig. 17B) and from *J. b. barrerai* by the truncate apex of the sternum IX (Fig. 13A, 14B) and the lack of an elongate and spiculated intersegmental membrane (Fig. 16A, 17B). Females are separated from those of *J. hayesi* by the absence of a large dorsal lobe on the caudal margin of sternum VII (Fig. 19A, 19C), while indistinguishable from both subspecies of *J. breviloaba*.

Description.—**Head.** Preantennal area with 3 rows of setae in male (7–8, 4, and 3 on each side); female (7–8, 4, and 3 on each side). Three rows of setae in postantennal area of male (3, 5, and 7 on each side); female (3, 6, and 6 on each side). Other features of head indistinguishable from those of *J. eckerlini*. **Thorax.** Pronotum with single row of 6 setae on each side, otherwise thorax indistinguishable from *J. eckerlini*. **Legs.** Fifth tarsal segment of each leg with 2 preapical plantar bristles; these of fore and mesothoracic legs more spiniform than those of metathoracic leg, stouter in male than female. **Unmodified Abdominal Segments.** Spinelets of tergites I–IV (1, 2, 1, 1 on each side, respectively). Female sternites III–VI, each with row of 3 setae on each side. **Modified Abdominal Segments, male.** Dorsocaudal margin of tergum VIII a smoothly rounded right angle; without setae. Dorsal margin with 3–4 slender setae and 2 larger setae; anterolateral group of 2–3 setae; ventrolateral group of 2–3 setae. Basimere elongate, neck-like with P1 narrow, height equal to apex of telomere. Two acetabular bristles borne on projection. Telomere distinctly tapered base to apex; adorned with single thick heavily pigmented spiniform seta and 4 slender marginal setae, all on mesal surface (Fig. 10C). Sternum VIII slender, pencil-like with single seta on each side; apex beyond setae with bifurcate membranous extension with unique shape (Fig. 17B). Intersegmental membrane with bulbous extension protruding caudad between distal arms of sternum IX. Distal arm of sternum IX divided into proximal sclerotized basal portion and distal enlarged structure, each separated by a flexure point. Distal portion narrow near point of flexure; widening toward ventral inverse seta. Inverse setae both set back from margin with a distinct lobe anterior to each. Portion dorsal to inverse setae extending oblique to bluntly rounded apex. Lateral patch of many short, fine setae on enlarged portion of sternum IX (Fig. 14B). **Aedeagus.** Median dorsal lobe with sclerotized thickening along dorsal margin; loop-like intrusion as it turns caudad. Lateral lobe small near apex; enlarging ventrally. **Modified Abdominal Segments, female.** Tergum VIII with 4 setae along caudal margin; 2 short mesal setae anterior to margin. Tergum VIII with dorsolateral patch of 3–4 setae, ventrolateral patch of 2–3 setae on tergum VIII. Ventrocaudal margin of ventral anal lobe as broad as length of lobe. Anal stylet with long apical seta, ventrolateral medium length seta, one dorsal minute seta at base of apical seta. Main row of sternum VII with 5–6 long setae; caudal margin undulate (Fig. 19C). Bursa copulatrix about same length as spermatheca (Fig. 22D).

Dimensions (slide mounted specimens).—Male, 2.1 mm ($n=1$); average length of females, 2.5 mm, range: 2.4–2.8 mm ($n=6$).

Etymology.—This species is named in honor of Taylor J. Maxwell, friend, colleague, and graduate student, who unselfishly collected fleas in Oaxaca, Mexico, during mammalogy studies conducted by Dr. Duke R. Rogers, Brigham Young University. Mr. Maxwell generously provided these specimens to the author for study. The inability to classify his material with current literature was a major catalyst for embarking upon this revision.

Remarks.—Field notes indicate this small series was collected in “mesa, pine, oak forest, rocks.” Associations with other flea species included several specimens of *Epitedia wenmanni* (Rothschild 1904), an unidentified species of *Peromyscopsylla* I. Fox, 1939, and *J. bullisi* (2 males, 1 female).

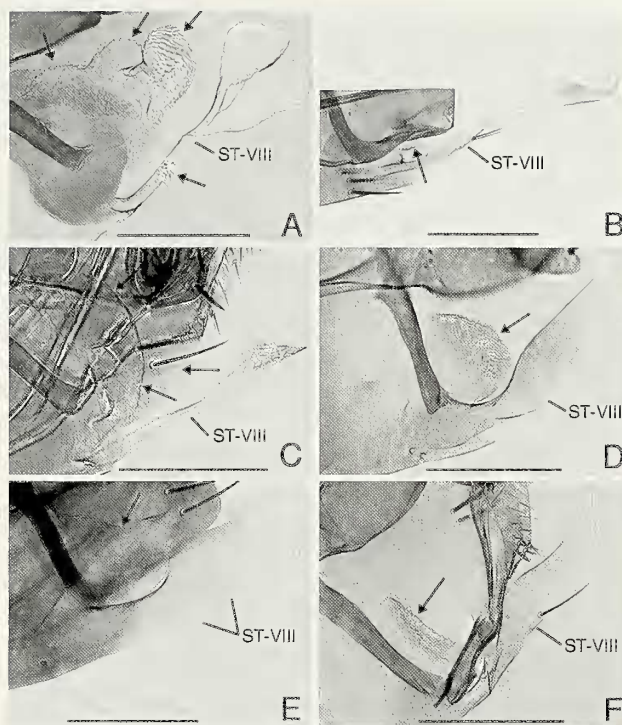


Fig. 17.—Male sterna VIII and intersegmental membranes between sternites VIII (ST-VIII) and IX (black arrows) of *Jellisonia*: A, *J. klotsi*; B, *J. maxwelli* n. sp.; C, *J. painteri*; D, *J. bullisi*; E, *J. grayi*; F, *J. ironi*. (Scale = 200 μ).

Jellisonia (Jellisonia) painteri Hastriter and Eckerlin, 2003

(Fig. 2A–E, 4B, 6D, 10D, 14C, 17C, 19D, 22E, 25B)

Jellisonia painteri. Hastriter and Eckerlin. 2003. *Annals of Carnegie Museum*, 72:215–221.

Type Material.—**GUATEMALA. Zacapa:** Río Hondo, Sierra de las Minas, 6 km NNW San Lorenzo (15°08'26"N, 89°40'36"W), 2200 m, ex *Habromys lophurus* (Osgood 1904), 12 April 1998, R.P. Eckerlin (holotype male) (USNM).

Diagnosis.—Males of *J. painteri* are separable from all species except *J. klotsi* and *J. guerrerensis* by the following combination of characters: median dorsal lobe without a secondary ventral lobe or a loop-like sclerotized intrusion; crochet linear opposed to flask-like (Fig. 6D); the apex of the distal arm of sternum IX does not project caudad. The lack of a concavity on the ventral margin of distal arm of sternum IX differentiates it from *J. klotsi* and *J. guerrerensis* (Fig. 14C). For a detailed diagnosis of *J. painteri* females, see Hastriter and Eckerlin (2003).

Material Examined.—**GUATEMALA. Baja Verapaz:** Finca la Union (15°12'N, 90°12'W), ex *Nyctomys sumichrasti* (Saussure 1860), 1 female (MWH). **Zacapa:** Río Hondo, Sierra de las Minas, 6 km N San Lorenzo (15°08'26"N, 89°40'36"W), 2200 m, ex *H. lophurus*, male holotype and 6 male, 12 female paratypes, ex *Peromyscus grandis* Goodwin, 1932, female allotype and 5 male paratypes, ex *Reithrodontomys microdon* Merriam, 1901, 1 male, 1 female paratypes (for repositories of type material see distribution Hastriter and Eckerlin 2003:216).

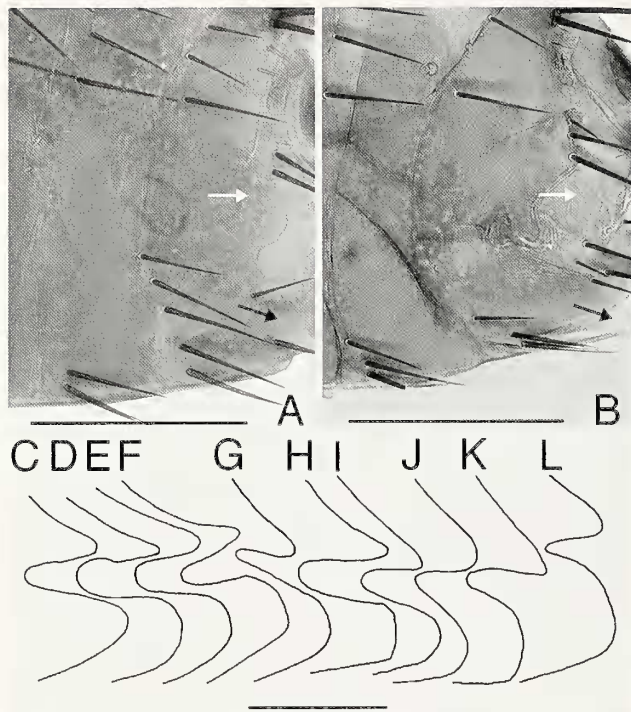


Fig. 18.—Female sternal features of *Jellisonia* species: A–B, Female sternites VI and VII of *Jellisonia* species (white and black arrows = dorsal and ventral lobes of sternum VII, respectively); A, *J. eckerlini* n. sp. (paratype); B, *J. falcata* (allotype); C–L, caudal margin of female sternite VII: C–E, *J. klotsi*, Jalisco, Nevado de Colima; F, *J. klotsi*, Distrito Federal, 5 km SW Parres; G, *J. klotsi*, Estado de México, Lagunas de Zempoala; H, *J. klotsi*, Estado de México, Río Frio, Llano Grande; I, *J. dybasi*, holotype, Veracruz, Acajete (= *J. klotsi*); J–K, *J. guerrensis*, Oaxaca, Santa María Yacochi; L, *J. guerrensis*, allotype, Agua Fria, 22 km SW Yextla. (Scale = 200 μ).

Remarks.—Hastriter and Eckerlin (2003) proposed *H. lophurus* and *P. grandis* as the preferred hosts for *J. painteri*. Wilson and Reeder (1993) indicated that *P. grandis* occurs in the southern part of Alta Verapaz Department and through northeastern Baja Verapaz Department, Guatemala, while *H. lophurus* has a broader distribution from the highlands of Chiapas, Mexico, to central Guatemala and northwestern El Salvador. The known distribution of this flea is limited to the departments of Zacapa and Baja Verapaz. It probably follows the distribution of its preferred host species and may occur in montane habitats of southwestern Mexico, Guatemala, El Salvador, and possibly northwestern Honduras. Additional collecting, especially from *H. lophurus*, is required to further clarify the distribution of this flea.

Jellisonia (Jellisonia) tiptoni (Méndez and Altman, 1960), **new combination**
(Fig. 4C, 7A, 10E, 14D, 20A, 22F, 25A)

Kohlsia tiptoni Méndez and Altman. 1960. Proceedings of the Entomological Society of Washington, 62:45–50.

Type Locality.—PANAMA. Panamá: Cerro Azul [= Cerro Prominente], ex *Didelphis marsupialis* Linnaeus, 1758, 29 January 1958, MCF-PMS, (holotype male, USNM No. 65493),

and ex *Tylomys panamensis* (Gray 1873) (allotype female) (USNM).

Diagnosis.—Male: As in *J. falcata*, this taxon differs from all other members of the subgenus by the bifurcate median dorsal lobe, shape of the telomere, and details of the distal arm of sternum IX (Fig. 5D, 7A, 9D). There are four marginal setae on the telomere of *J. tiptoni* compared to three on that of *J. falcata* (Fig. 9D, 10E). Female: Only *J. tiptoni* and *J. falcata* have a sigmoid-shaped bursa copulatrix (much longer than the spermatheca) but *J. tiptoni* differs from *J. falcata* by the acutely sharp ventral lobe of sternum VII (Fig. 18B, 20A).

Material Examined.—COSTA RICA. Puntarenas: Monteverde, Río Guacimal, ex *N. sumichrasti*, 1 female (CMNH).

GUATEMALA. Izabal: Cerro San Gil las Torres, 915 m, ex *N. sumichrasti*, 14 June 1994, R.P. Eckerlin, 6 males, 2 females (RPE); Cerro San Gil las Brisas, ex *N. sumichrasti*, 29 June 1994, G.E. Meier, 1 female (RPE); and Cerro Poso de Agua, Mpio. Morales, ex *Tylomys nudicaudatus* [= *Tylomys nudicaudus* (Peters 1866)], 10 July 1994, G.E. Meier, 1 female (RPE).

HONDURAS. Lempira: Parque Nacional Celaque Don Tomás, 2083m, ex *P. mexicanus*, 13 February 1998, R.P. Eckerlin, 1 male (RPE).

NICARAGUA. Matagalpa: Santa María de Ostuma, 1250m, ex *Peromyscus mexicanus saxatilis* [= *P. mexicanus*], 3 July 1967, J.D. Smith, 1 female (CMNH).

PANAMA. See holotype and allotype (USNM).

Remarks.—*Kohlsia tiptoni* is transferred to the genus *Jellisonia* based on the same rationale as discussed in the Remarks section of *J. falcata*. It is noteworthy that these two closely related species both comprise the most southern distribution of the genus. The primary hosts are peromyscine rodents with the exception of several records of the semi-arboreal hosts *T. panamensis* and *T. nudicaudus* that are likely accidental associations.

Subgenus *Pleochaetoides* Augustson, 1944, **new status**

Type Species: *Pleochaetoides bullisi* Augustson, 1944. Journal of Parasitology, 30:366–368 (USNM No. 57189) (by monotypy).

Diagnosis.—The absence of a false comb on the dorsal margin of the metatibia is diagnostic for the subgenus. See details in diagnosis of the subgenus *Jellisonia* above. Diagnoses that follow will differentiate only species within the subgenus *Pleochaetoides*.

Jellisonia (Pleochaetoides) amadoi Ponce-Ulloa, 1989,
new subgeneric combination
(Fig. 2F, 10F, 24A)

Jellisonia amadoi Ponce-Ulloa. 1988. Folia Entomológica Mexicana, 76:179–181, figures 1A–C. Ponce-Ulloa and Llorente-Bousquets, 1996:558, 564.

Type Material.—MÉXICO. Guerrero: El Faisanal, 1140 m, Sierra de Atoyac de Álvarez, ex *P. megalops*, 29 October 1983, HP/JJG (holotype male) (UNAM).

Diagnosis.—Females are unknown, and males are distin-

guished from all other taxa within the genus by the "mane" of setae projecting perpendicular to the surface of the mesonotum, metanotum, and tergum I (Fig. 2F).

Material Examined.—MÉXICO. Guerrero: La Golondrina, Atoyac, 1750 m, ex *P. megalops*, 003 HP/560 JIG, 1 male paratype (UNAM).

Remarks.—Only the original type series of 11 males is known. Since the author was unable to examine all of the specimens, it is of value to present a summary of the data presented by Ponce-Ulloa (1988). Six of the 11 specimens were collected from *P. megalops* (1140–1750 m), two from *P. aztecus* (900 and 1400 m), two from *Oryzomys alfaroni* = *O. alfaroi* (J.A. Allen 1891) (1400 and 1550 m), and one from *N. mexicana* (1140 m). It is peculiar that the female was not collected considering the variety of hosts and apparent differences in elevations from which the type series was collected.

Jellisonia amadoi has several morphological features that are unique. The dorsal setae on the mesonotum, metanotum, and tergum I are fine and extend dorsad [similar to the mane of some other fleas, e.g., males of *Opisodasys pseudarctomys* (Baker 1904) and *Opisodasys vespertalis* (Jordan 1929)] as opposed to lying flat against the cuticle. The setae on apices of the first three segments of the hind tarsi are also extra long and slender. Several setae on each of these segments extend the length of the next two segments. Although the author did not examine specimens of *J. amadoi* in the UNAM collection, these two features were reportedly present in specimens deposited at UNAM (personal communication, Juan J. Morrone, UNAM).

Jellisonia (Pleochaetoides) bullisi (Augustson 1944)
(Fig. 1E, 4D, 7B, 11A, 14E, 17D, 20B, 21C, 23A)

Pleochaetoides bullisi Augustson, 1944. Journal of Parasitology, 30:366–368.

Jellisonia bullisi (Augustson): Traub, 1950:21–23; Eads, 1950:38–39; Ayala-Barajas et al., 1988:67; Ponce-Ulloa and Llorente-Bousquets, 1996:558.

Type Material.—UNITED STATES OF AMERICA. TEXAS. Bexar Co.: Camp Bullis, ex *Peromyscus pectoralis laceianus* [= *Peromyscus pectoralis* Osgood, 1904], 1 June 1944, Augustson (male holotype, USNM No. 57189). Traub later "designated" a female allotype with the following data appearing on the label: "Det. Traub 1950. Desig. Allotype" / "No. 700, Host: mouse, State: Nuevo León, Municip'y: Sabinas Hidalgo, V 1940, K.L. Knight" (FMNH).

Diagnosis.—Males of *J. bullisi* are similar to *J. ironsi* by the presence of a bifurcate median dorsal lobe (Fig. 7C–D), while they are distinguished by the number of dorsal notches in the metatibia (nine in *J. bullisi* and eight in *J. ironsi*). Female: Taxa that have only one seta in the penultimate dorsal notch (counting from proximal) include *J. bullisi* and *J. grayi*. The latter has two lobes on the caudal margin of sternum VII, while *J. bullisi* lacks a dorsal lobe and has a protruding ventral lobe (Fig. 20B).

Material Examined.—MÉXICO. Nuevo León: Sabinas Hidalgo, ex "mouse," female allotype (FMNH), 2 males, 1 female (BMNH), 3 males,

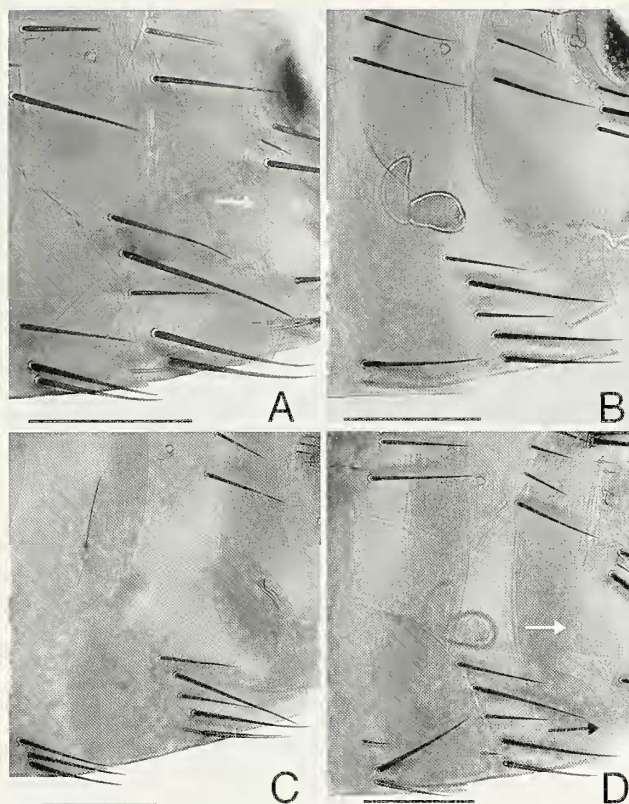


Fig. 19.—Female sternites VI and VII of *Jellisonia* species (white and black arrows = dorsal and ventral lobes of sternum VII, respectively): A, *J. hayesi*; B, *J. johnsonae* (paratype); C, *J. maxwelli* n. sp. (paratype); D, *J. painteri* (paratype). (Scale = 200μ).

1 female; Cola de Caballo, Barrancas, ex *Peromyscus* sp., 1 male (UNAM); 4 km SE Monterrey, ex *Peromyscus* sp., 2 males, 3 females (UNAM); Chipinque, 1311 m, ex *Peromyscus* sp., 2 males, 1 female (UNAM).

UNITED STATES OF AMERICA. TEXAS. Bexar Co.: Camp Bullis, ex *P. p. laceianus* [= *P. pectoralis*], male holotype (USNM). Kinney Co.: Kickapoo Cavern State Park, ex *P. pectoralis*, 3 male, 4 female (REL). Martin Co.: ex *Perognathus hispidus* [= *Chaetodipus hispidus*] Baird, 1858] 1 male (USNM). San Saba Co.: Colorado Bend State Park, ex *P. pectoralis*, 24 males, 22 females (CNC). Sutton Co.: ex *Peromyscus eremicus* Baird, 1858, 1 male, 1 female (CNC), 1 male, 1 female (REL), 1 male, 1 female (USNM). Travis Co.: ex "rodent nest," 1 female (REL). Uvalde Co.: Garner State Park, ex *Peromyscus* sp., 1 male (MWH).

Remarks.—A comparison of specimens from central Texas with those from Nuevo León and San Luis Potosí demonstrates little variation in either sex. Specimens from San Luis Potosí represent the known southern limits of this species. This species and *J. ironsi* are sympatric in the northern range of *J. ironsi*. *Peromyscus pectoralis* appears to be the preferred host of *J. bullisi*. Although a number of unidentified species of *Peromyscus* were listed as hosts, the importance of *P. pectoralis* is evident by the large series taken in San Saba County, Texas. *Jellisonia bullisi* and *J. ironsi* are closely related species, each sharing a similar bifurcate dorsal median lobe of the aedeagus (Fig. 7B, 7D) and a long sigmoid-shaped bursa copulatrix (Fig.

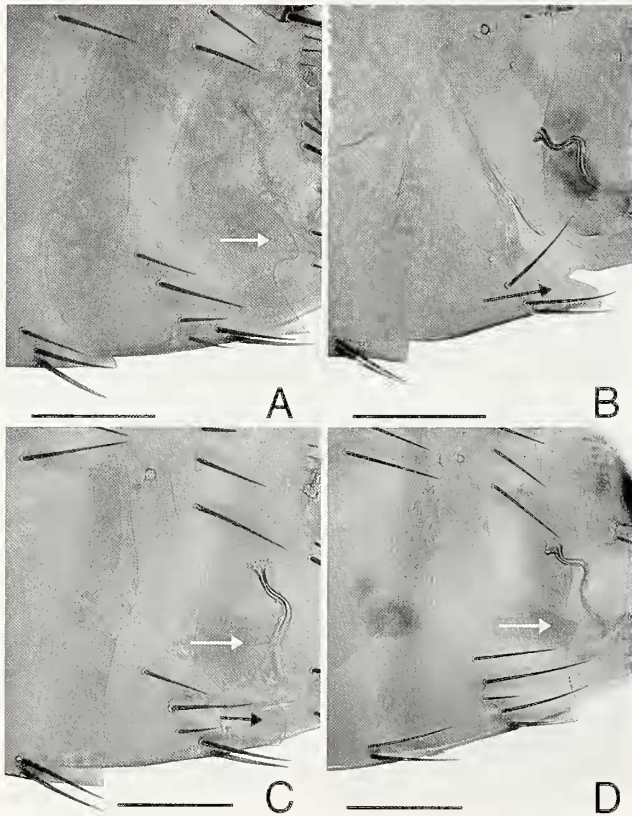


Fig. 20.—Female sternites VI and VII of *Jellisonia* species (white and black arrows = dorsal and ventral lobes of sternum VII, respectively): A, *J. tiptoni*; B, *J. bullisi*; C, *J. grayi*; D, *J. ironsi*. (Seale = 200 μ).

21C, 22H); however, *J. bullisi* has never been recorded on *B. taylori* and *J. ironsi* is recorded only once on *P. pectoralis*.

Jellisonia (*Pleochaetoides*) *grayi* Hubbard, 1958, new subgeneric combination
(Fig. 4E, 7C, 11B, 14F, 17E, 20C, 22G, 23B)

Jellisonia grayi Hubbard, 1958, Entomological News, 69:163. Ayala-Barajas et al., 1988:67; Ponce-Ulloa and Llorente-Bousquets, 1996:558.

Type Material.—MÉXICO. San Luis Potosí: El Salto, ex *Peromyscus boylii* (Baird 1855), 15 December 1955, C. Hayden (holotype male/allotype female) (BMNH).

Diagnosis.—Male: This is a distinctive species and easily separated by the large lanceolate ventral inverse seta, extreme width of distal arm of sternum IX, and the evenly rounded and protruding ventral lobe of the telomere (Fig. 11B, 14F). Female: The distinction of having a single seta in dorsal notch number seven of the metatibia (counting from proximal) is shared only by *J. bullisi*. The caudal margin of sternum VII has two broadly rounded lobes compared to only a ventral lobe in *J. bullisi* (Fig. 20B–C).

Material Examined.—MÉXICO. Guerrero: Chilpancingo, ex *Peromyscus thomasi* [= *M. thomasi*], 2 females (UNAM). Querétaro: NW

Santa Inés, ex *P. boylii*, 1420 m, 3 females (UNAM). San Luis Potosí: El Salto, ex *P. boylii*, holotype, allotype, 2 male, 1 female paratypes (BMNH), 1 male paratype, ex *Sigmodon hispidus* Say and Ord, 1825, 1 female paratype (USNM); 3 km NE El Salto, 15 km N Naranje, ex *Peromyscus* sp., 1 male, 3 females (BMNH), 13 males, 11 females (CMNH), 2 males, 1 female (CNC), 24 February 1963, R. Traub, 2 males, 2 females (REL), 1 male, 15 females (USNM). Tamaulipas: [Slide labeled "Tamps." interpreted as state of Tamaulipas, Mexico], ex mouse nest, 1 male (CMNH).

Remarks.—The crochet of this species is unique in the finely spiculated, nearly feather-like apex (Fig. 7C), the ventral inverse seta is extremely broad and lanceolate (Fig. 14F), and the telomere bears a distinct denticle on the anterior margin about one-fourth the distance from the apex (Fig. 11B). The disjunct distribution of this species supports the need for additional collecting. Neither the host preference, nor distribution can be inferred with existing data.

Jellisonia (*Pleochaetoides*) *ironsi* (Eads 1947), new subgeneric combination
(Fig. 1F, 4F, 7D, 11C, 15A, 17F, 20D, 22H, 23A)

Trichopsylla (*Pleochaetis*) *ironsi* Eads, 1947. Annals of the Entomological Society of America, 39:545–548.

Jellisonia ironsi (Eads): Randolph and Eads, 1946:599; Traub, 1950:20–21; Barrera, 1953:217–218; Hubbard, 1958:163; Smit, 1958:205–206; Ayala-Barajas et al., 1988:69; Ponce-Ulloa and Llorente-Bousquets, 1996:558.

Type Material.—UNITED STATES OF AMERICA. TEXAS. Lavaca Co.: Yoakum, ex *Baiomys taylori*, 21 March 1946, R.B. Eads [The holotype and allotype were deposited in the Texas Department of Health, Austin, Texas and can not be located. A specimen in the USNM is labeled "paratype" and has the same data as the holotype. It is hereby designated as the neotype and remains in the USNM.]

Diagnosis.—Male: *Jellisonia ironsi* and *J. bullisi* exclusively share a bifurcate median dorsal lobe (Fig. 7C–D). The latter has nine dorsal notches on the metatibia opposed to *J. ironsi* with eight. Female: This taxon differs from all species in the genus by the pointed shape of the dorsocaudal lobe and very weak subtending concavity of sternum VII (Fig. 20D).

Material Examined.—UNITED STATES OF AMERICA. Bexar Co.: Salado Creek, Fort Sam Houston, ex *Microtus* sp., 1 male (BYU); Misty Park Street, NW San Antonio, ex *B. taylori*, 1 male (MWH); Lackland Air Force Base, San Antonio, ex "*Neotoma* nest," 3 males (MWH); San Antonio, ex *S. hispidus*, 1 male (FSCA). Coryell Co.: ex *B. taylori taylori* [= *B. taylori*], 5 females (USNM), ex *Dipodomys elator* Merriam, 1894, 2 females (USNM), ex *Mus musculus* Linnaeus, 1758, 1 female (USNM), ex *Peromyscus leucopus* Rafinesque, 1818, 2 females (USNM), ex *B. taylori taylori* [= *B. taylori*], 1 male, 2 females (CNC), 2 females (GML), 1 male, 1 female (MWH), ex *B. taylori taylori* [= *B. taylori*], 1 female (BMNH). Dallas Co.: 2.4 km W Desoto, ex *B. taylori*, 15 February 1988, McAllister, 4 females (BMNH). Johnson Co.: 17 km SW Cleburne, ex *B. taylori*, 6 November 1987, McAllister, 1 male (BMNH); 19 km SW Cleburne, 26 September 1987, 1 male, 1 female (BMNH); 25 October 1987, 1 male, 6 November 1987, 3 males, 1 female (REL), ex *Cryptotis parva* (Say 1823), 16 November 1987, 2 females (REL), ex *P. leucopus*, 14 November 1987, McAllister, 1 female (REL); 11 March 1988, 1 male, 1 female (REL), ex *P. maniculatus*, 11 March 1988, 3 males, 4 females (REL), ex *Reithrodontomys montanus* (Baird 1855), 11 March 1988, 5 males, 5 females (REL). Lavaca Co.: Hallettsville, ex *B. taylori*, 1 male, 1 female (CNC), 1 male

paratype; Yoakum, ex *B. taylora*, 2 male, 2 female paratypes (CMNH), 4 male, 4 female paratypes (USNM), 1 male, 1 female paratype (BMNH). **San Patricio Co.:** Welder Wildlife Refuge, Sinton, ex *B. taylora*, 5 males, 4 females (CNC), ex *Reithrodontomys* sp., 1 male, 2 female (CNC). **San Saba Co.:** Colorado Bend State Park, ex *P. pectoralis*, no date, A. Santos, 1 male (REL). **Somervell Co.:** 5 km NNE Nemo, ex *B. taylora*, 1 male (REL). **County Unknown:** Roatun [?], ex *B. taylora*, 1 female (USNM).

COSTA RICA. Cartago: Mt. Irazu, 4.8 km below end of road to crater, 3140 m, ex *Peromyscus* sp., 4 females (CMNH). **Alajuela:** San Jose, Juan Rafael Cabeza, 1220 m, ex *Peromyscus* sp., 3 females, ex "rat," 3 females (CMNH).

GUATEMALA. Jutiapa: 1.6 km SE Jutiapa, ex *Baiomys* sp., 1 female (CMNH).

MÉXICO. Chiapas: Comitán, ex *Baiomys musculus*, 1 female (BMNH); Tinitaria, ex *B. musculus*, 1 female (USNM). **Distrito Federal:** Cerro Zacayuca, ex *B. taylora*, 1 female (BMNH), 1 male, 1 female (CMNH), 2 female (USNM). **Durango:** Peña de Aguila, ex *Peromyscus* sp., 1 male, 1 female (CMNH), ex *Reithrodontomys* sp., 1 male, 2 females (CMNH), ex *Peromyscus* sp., 1 female (USNM); 4.4 km SE Atotonilco, 2036 m, ex *B. taylora*, 26 July 1967, M.K. Petersen, 2 females (REL). **Jalisco:** Zapotlanejo, 1677 m, ex *Mus* sp. or *Baiomys* sp., 4 females (MWH), ex *Baiomys* sp., 17 December 1959, R Traub, 19 December 1959, R. Traub, 1 male, 3 females (REL), ex *Baiomys* sp., 3 females, ex *Mus* sp., 9 females, ex *Peromyscus* sp., 1 female, ex *Sorex* sp., 1 female (USNM). **México:** Tlalnepantla, 2300 m, ex *Baiomys* sp., 1 male, 5 females (UNAM). **Morelos:** Huatla, south of Cuernavaca [Cuernavaca], ex unknown, 1 male, 1 female (MWH); Tepoztlán, ex *Baiomys* sp., 1 male, 2 females (UNAM). **Nayarit:** San Cayatano, 8 km W Tepic, ex *Peromyscus* sp., 3 females (USNM), 1 male, 1 female (CMNH), 1.6 km W Tepic, 793 m, ex *Baiomys* sp., 1 male, 2 females (CNC), ex *Mus* sp., 1 female (CMNH), ex *Cryptotis* sp., 1 male (CMNH). **Oaxaca:** 4.8 km E Oaxaca, Benito Juárez National Park, Cerro San Felipe, 1680 m, ex *B. m. musculus* [= *B. musculus*], 1 male, 1 female (CMNH); 15 km NW Miahuatlán, 1600 m, 1 male, 1 female (UNAM); Monte Albán, 1830 m, ex *B. m. musculus* [= *B. musculus*], 1 female (CMNH), 1 female (USNM). **Puebla:** Matamoros, ex *Baiomys* sp., 1 female (MWH). **San Luis Potosí:** El Salto, 11.2 km N Naranje, ex "mouse nest under stone," 1 male, 3 females (USNM), 1 male (BMNH), ex *B. taylora*, 2 males (CNC); 3.2 km E El Salto, 14.5 km N Naranje, ex *B. taylora*, 1 male, 1 female (CMNH). **State Unknown:** Cerro de la Caldera, 2300 m, ex *B. taylora*, 1 male (UNAM).

Remarks.—*Jellisonia ironsi* is the most widely distributed species in the genus, occurring from Dallas County, Texas, to near the border of Alajuela and Cartago Provinces, Costa Rica. The Costa Rican records are remote from the nearest records in Guatemala. This small series (females only) is indistinguishable from females from Guatemala, Chiapas, Mexico, and Texas, U.S.A. The preferred host for *J. ironsi* is *B. taylora*, occurring throughout its range, although the Costa Rican records are extralimital for *Baiomys*. The three different collections of females from Costa Rica were obtained from a "rat" and from unidentified species of *Peromyscus*. These hosts probably represent *P. mexicanus*, since it is the only species of *Peromyscus* occurring that far south according to Wilson and Reeder (1993). Host species other than *Baiomys* are likely accidental associations. Although *Jellisonia* is typically found in montane habitats, *J. ironsi* is common at very low elevations as well as at higher elevations. This is undoubtedly a reflection of the broad altitudinal distribution patterns of *Baiomys*.

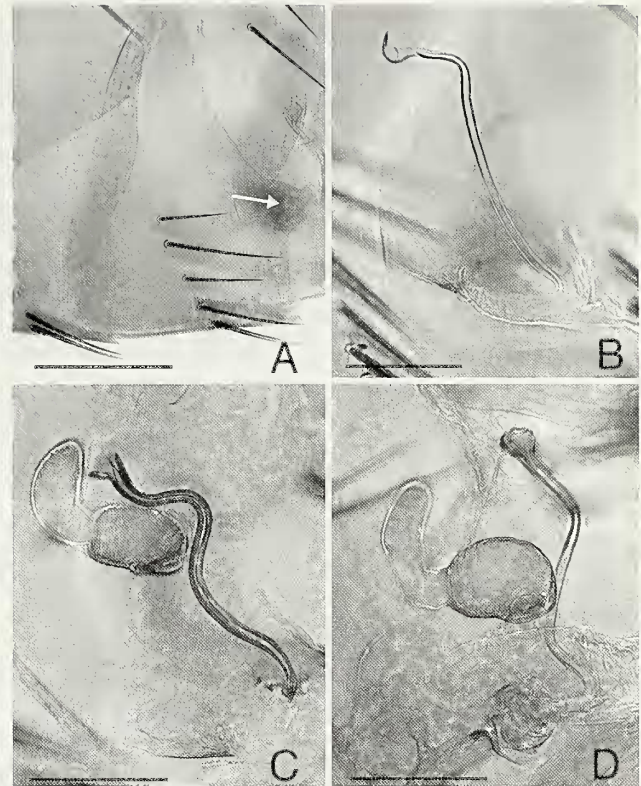


Fig. 21.—Female features of *Jellisonia* and *Kohlsia* species: A, Sternites VI and VII (white arrow = dorsal lobe of sternum VII), *J. wisemani* (Scale = 200μ); B, Bursa copulatrix, *Kohlsia pelaezi*; C, Spermatheca and bursa copulatrix, *J. bullisi*; D, Spermatheca and bursa copulatrix, *J. falcaia* (allotype). (Scale = 100μ).

Jellisonia (*Pleochaetoides*) *mexicana* Ponce-Ulloa,
1989, new subgeneric combination
(Fig. 4G, 8A, 11D, 15B, 24B)

Jellisonia mexicana Ponce-Ulloa. 1988. Folia Entomológica Mexicana, 76:181–185. Ponce-Ulloa and Llorente-Bousquets, 1996:558, 564.

Type Material.—**MÉXICO. Guerrero:** Nueva Delhi, 1400 m, ex *N. mexicana*, 26 March 1984, HP/JJG (holotype male, allotype female) (UNAM).

Diagnosis.—Males: A combination of nine dorsal tibial notches (opposed to eight), a non-bifurcate median dorsal lobe, and a vestigial sternum VIII without setae characterize only *J. mexicana*, *J. wisemani*, and *J. amadoi*. It differs from the latter species in the absence of a "mane" on the mesonotum, metanota, and tergum I. The major difference in *J. wisemani* is the shape of the median dorsal lobe, which is broadly rounded in *J. wisemani* and narrows towards the apex in *J. mexicana* (Fig. 8A–B). Females of *J. ironsi*, *J. wisemani*, and *J. mexicana* are taxa with two setae in dorsal tibial notch number seven (penultimate fascicle) opposed to one seta. Females inseparable from those of *J. wisemani* but the dorsocaudal lobe on sternum VII is rounded in *J. mexicana* and pointed in *J. ironsi* (Fig. 20D).

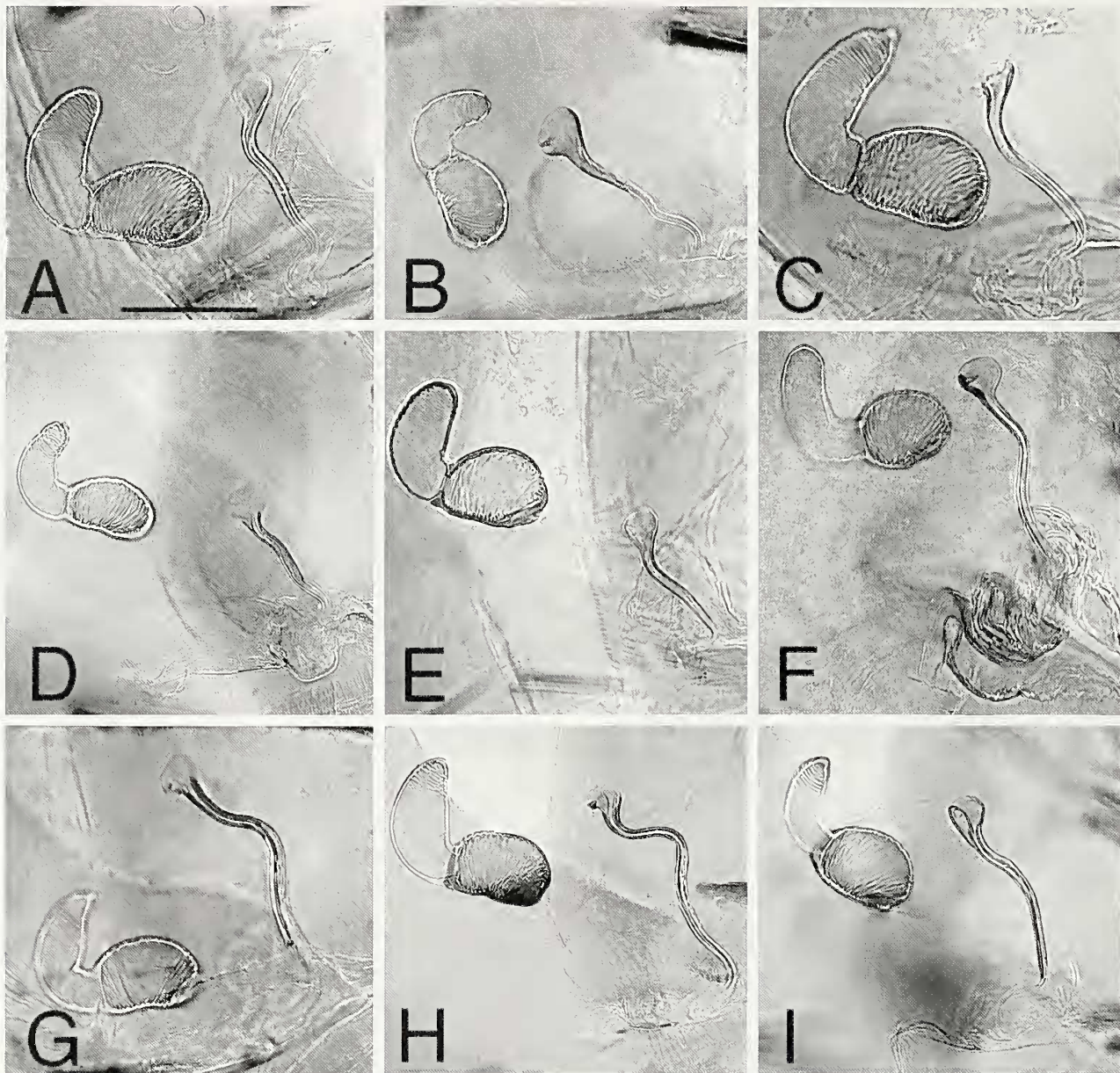


Fig. 22.—Spermathecae and bursae copulatrices of *Jellisonia* species: A, *J. eckerlini* n. sp. (paratype); B, *J. hayesi*; C, *J. johnsonae* (paratype); D, *J. maxwelli* n. sp. (paratype); E, *J. painteri* (paratype); F, *J. tiptoni*; G, *J. grayi*; H, *J. ironsi*; I, *J. wisemani*. (Scale = 100μ).

Material Examined.—**MÉXICO. Durango:** Revolucioneros, 2165 m, ex *Peromyscus* sp., 3 males (CMNH); 1.6 km SW Revolucioneros, 1982–2043 m, ex *Peromyscus* sp., 13 males, 5 females (CMNH). **Guerrero:** 8 km E Omiltemi, 1890 m, ex *Peromyscus* sp., 1 male (CMNH). **Jalisco:** 9.7 km W San Marcos, 1646 m, ex *Liomys pictus pictus* [= *Liomys pictus* (Thomas 1893)], 1 male (CMNH). **Nayarit:** 5.5 km E San Blas (Hotel Bucanaro), ex *L. pictus*, 1 male (CMNH), ex *P. eremicus*, 1 female (CMNH). **Sinaloa:** 1 km NE Santa Lucía, 1128 m, ex *Liomys pictus escuinapae* [= *L. pictus*], 1 female (CMNH); ex *P. b. spicilegus* [= *P. spicilegus*], 9 males, 13 females (CMNH), ex *Reithrodontomys fulvescens tenuis* [= *R. fulvescens* J.A. Allen, 1894], 6 males, 1 female (CMNH); 5 km NE Santa Lucía, 1524 m, ex *P. b. spicilegus* [= *P. spicilegus*], 2 males (CMNH); 1.9 km NE Santa Lucía, ex *L. pictus*, 1 male (CMNH); 1.9 km NE Santa Lucía, ex unknown, 3 males, 1 female (CMNH); 1.6

km E Pánuco, ex *N. mexicana*, 1 male (CMNH). **Sonora:** 12.9 km SSE Alamos on Río Cuchujaquí, ex *L. pictus*, 1 male (CMNH).

Remarks.—This is the only species in the genus in which the paired lateral lobes of the aedeagus extend well beyond the apex of the median dorsal lobe. The shape of the lateral lobes is quite variable. These lobes are narrower in some specimens than others. The width of these lobes is determined by the depth of the shallow sinus in the ventroapical margin. The male from the state of Nayarit has a more oblique ventroapical margin than other specimens. Throughout its range, it frequents a number of different host species without obvious preference.



Fig. 23.—Maps illustrating known distribution of *Jellisonia* species: A, *J. bullisi*, *J. ironsi*, and *J. wisemani*; B, *J. klotsi* and *J. grayi*.

Jellisonia (*Pleochaetoides*) *wisemani* Eads, 1951, new subgeneric combination
(Fig. 4H, 8B, 12A, 12B–G, 15C, 21A, 22I, 23A)

Jellisonia wisemani Eads, 1951. Journal of Parasitology, 37:147–150. Barrera, 1953:218 [not examined]; Ponce-Ulloa and Llorente-Bousquets, 1996:558.

Jellisonia bonia Traub and Johnson, 1952. American Museum Novitates, No. 1558:7–11. Ayala-Barajas et al., 1988:66–67; Ponce-Ulloa and Llorente-Bousquets, 1996:558. New synonymy.

Type Material.—**MÉXICO.** Jalisco: 4.8 km N Guadalajara, ex *Peromyscus melanophrys consobrinus* [= *Peromyscus melanophrys* (Coues 1874)], 19 January 1949, Wiseman (KU), R.H.B., Kansas Museum of Natural History field party (holotype male, allotype female) (USNM No. 60825).

Diagnosis.—Male: A combination of nine dorsal tibial notches (opposed to eight), a non-bifurcate median dorsal lobe, and a vestigial sternum VIII without setae characterize only *J. mexicana*, *J. wisemani*, and *J. amadoi*. It differs from the latter species in the absence of a “mane” on mesonotum, metanotum, and tergum I. The major difference in *J. mexicana* is the shape of the median dorsal lobe that narrows towards the apex in *J. mexicana* and is broadly rounded in *J. wisemani* (Fig. 8A–B). Female: Taxa with two setae in dorsal tibial notch number seven (penultimate fascicle) as opposed to one seta, include *J. ironsi*, *J. wisemani*, and *J. mexicana*. Females of *J. wise-*

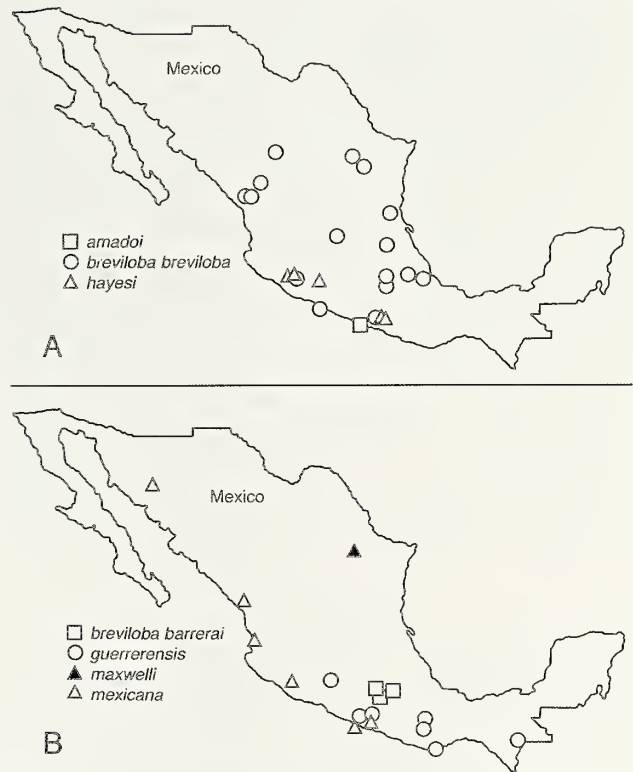


Fig. 24.—Maps illustrating known distribution of *Jellisonia* species: A, *J. amadoi*, *J. breviloba breviloba*, and *J. Hayesii*; B, *J. breviloba barrerae*, *J. guerrensis*, *J. maxwelli*, and *J. mexicana*.

mani are inseparable from those of *J. mexicana* but the dorsocaudal lobe on sternum VII is rounded in *J. wisemani* and pointed in *J. ironsi* (Fig. 20D, 21A).

Material Examined.—**GUATEMALA.** Chiquimula: 2.4 km NW Esquipulas, 945 m, ex *Peromyscus* sp., 2? females (BMNH), 2 males (CMNH); 4 km ENE Esquipulas, 915 m, ex *Peromyscus* sp., 1 female (CMNH), 2 males (BMNH); 4 km ENE and 4.8 km SE Esquipulas, ex *Oryzomys* sp., 1 male (CMNH).

MÉXICO. Chiapas: Volcán Kagchiná, 3.5 km N las Margaritas, 1500 m, ex *Neotoma mexicana chamula* [= *N. mexicana*], 3 males, 5 females (CMNH); Cueva Santa Rosa, 2 km N, 3 km W las Margaritas, 1500 m, ex *N. m. chamula* [= *N. mexicana*], 1 male (CMNH); Cueva Llano Ridondo, 3 km N las Margaritas, 1500 m, ex *N. m. chamula* [= *N. mexicana*], 1 male, 1 female (CMNH); Pan American Highway over Río San Gregorio 32 km from Guatemalan border, *Neotoma ferruginea* [= *N. mexicana*], 2 males (CMNH). Durango: Peña de Aguila, 1921 m, ex *Peromyscus* sp., 3 males (CMNH). Jalisco: Calderon Hacienda, 13 km E Zapotlenejo, 39 km S Guadalajara, 1738 m, ex *Baiomys* sp., 2 males (CMNH), ex *Peromyscus* sp., 1 male, 1 female (CMNH), 1 female (USNM), ex *Rattus* sp., 4 males, 1 female (CMNH); Zapotlenejo, 39 km S Guadalajara, 1677 m, ex *Peromyscus* sp., 18 males, 20 females, ex *Reithrodontomys* sp., 2 males (CMNH), ex *Sorex* sp., 1 male, 2 females (CMNH); 5.6 km WNW Zapotitlic, 1555 m, ex *L. pictus*, 1 male (CMNH); Huascato, ex *Bassariscus* sp., 2 males (UNAM). Guerrero: La Jolla, Cacahuamilpa, ex “nest of *Peromyscus*,” 2 males, 2 females (UNAM), 2 males, 1 female (CMNH); 4.8 km E Omiltemi, 1912 m, ex *Peromyscus* sp., 1 male (CMNH); 8 km E Omiltemi, ex *Peromyscus* sp., 4 males, 6 females (CMNH); 16 km S Taxco (near Telcalpuco), 1400 m, ex *Peromyscus* sp., 1 male, 4 females (CMNH). Michoacán: 18 km W Jiqualpan, 2043 m, ex *P. boylii*, 1 male, 1 female (BMNH), 1 male (CNC); Cerro Guyman, ex *Peromyscus* sp.,

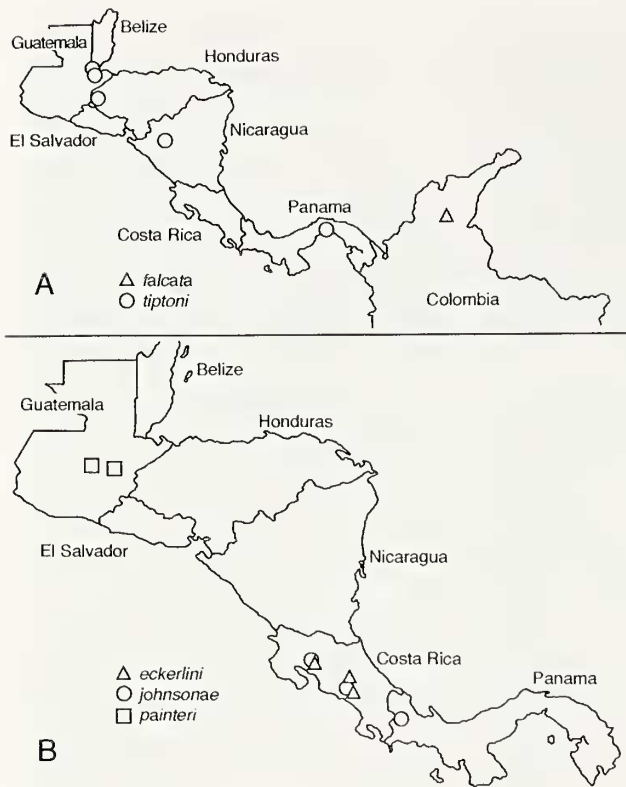


Fig. 25.—Maps illustrating known distribution of *Jellisonia* species; A, *J. falcata* and *J. tiptoni*; B, *J. eckerlini*, *J. johnsonae*, and *J. painteri*.

1 male (CNC), 1 female (CMNH); 11.3 km S Tambisiatio, 823 m, ex unknown, 1 female (CMNH); 4.8 km NE Patzcuaro, ex *Sigmodon* sp., 1 male (CMNH); 4.8 km SW Turundeo, 1900 m, ex *Peromyscus* sp., 1 male (UNAM); 13 km SW Jacona, ex *Reithrodontomys* sp., 1 female (UNAM). **Oaxaca:** Huajuapán de León, 1730 m, ex *Peromyscus* sp., 1 male, 1 female (CMNH); 10 km SE Miahuatlán, ex *P. melanophrys*, 4 males, 6 females (CMNH); Monte Albán, 1829 m, ex *P. maniculatus fulvus* [= *P. maniculatus*], 1 male, 1 female (CMNH), ex *P. truei* [= *P. gratus*], 3 males, 2 females (UNAM). **Morcos:** Tepoztlán, ex *P. lylocetes* = *P. aztecus*, 1 female (UNAM), ex *Peromyscus* sp., 1 male, 1 female; Derrame Chichinautzin, 2110 m, ex *N. torquata* [= *N. mexicana*], 1 male. **Puebla:** Villa Juárez, Xicotepec [Xicotepec Juárez], 1200 m, ex *Peromyscus* sp., 1 male, 1 female (UNAM). **Veracruz:** El Coderio, Jalapa, ex *Peromyscus* sp., 2 females (UNAM); 4.8 km NE Las Minas, 1200 m, ex *P. mexicanus*, 3 males, 2 females (CMNH). Texolo, ex *Peromyscus* sp., 18 October 1950, G.W. Wharton (*J. bonia*, male holotype) (AMNH).

Remarks.—This species was described by Eads (1951) from one male and seven females. Unfortunately, Eads based his diagnosis of the male on the shape of the telomere, which in the holotype is an anomalous condition, or extreme variation. Subsequently, Traub and Johnson (1952) described *J. bonia*. Following the description of both species, large series were collected from a broad geographical area (southern states of Sinaloa and Durango east to Veracruz and south to Guatemala) to include collection sites near the type locality of *J. wisemani*. Examination of these demonstrate the telomere to be highly variable, to include minor differences in the arrangement of the marginal spiniform setae (Fig.

12A–G). These variations could represent different subspecific populations but character clines are not apparent. Several notes hand penned by Robert Traub among his collection indicated that *J. bonia* was a synonym of *J. wisemani*. Such comments perhaps substantiate why he never described the female of *J. bonia*, as numerous females were identified on the labels of his slides as *J. bonia*. This species is herein placed as a junior synonym of *J. wisemani*.

Other Species Described in *Jellisonia*

Kohlsia ortizi (Vargas 1951)

Jellisonia ortizi Vargas. 1951. Revista del Instituto de Salubridad y Enfermedades Tropicales. 12(1–4):39–43 [not examined].

Kohlsia ortizi (Vargas); Haddow et al., 1983:98.

Type Material.—**MÉXICO. Chiapas:** Comitán, 1620 m, ex *Peromyscus* sp., 4 December 1949 (holotype female) (INDRE).

Material Examined.—**MÉXICO. Chiapas:** 6 mi NW of Teopisca, 1677 m, ex *P. m. guatemalensis* [= *P. guatemalensis*], 30 August 1953, Furman and Price, 1 female (BMNH).

Remarks.—Haddow et al. (1983) evidently recognized the incorrect generic assignment of this species to *Jellisonia*, since it was listed in their work (p. 98) as *Kohlsia ortizi*. Since rationale was not provided as to why they transferred *J. ortizi* to the genus *Kohlsia*, a discussion is provided here. *Jellisonia ortizi* was described from five females; the male is unknown. The holotype and four paratypes were “deposited in the Instituto de Salubridad y Enfermedades Tropicales and the Instituto de Biología, U.N.A.M.” according to Vargas (1951). None of the type series could be located, despite multiple inquiries and efforts to locate them. Unfortunately, the majority of characters used in the original description of *J. ortizi* are generic characters shared by *Kohlsia* and *Jellisonia*. Examination of one female collected near the type locality of *J. ortizi* matches the illustrations of Vargas (1951) and I believe it to be conspecific. Noteworthy characters that are more commensurate with *Kohlsia* than those of *Jellisonia* include: 1) the structure of the sclerotized portion of the bursa copulatrix (long with a right angle bending cephalad just proximal to perula) (see *Kohlsia pelaezi* Barrera, 1956, Fig. 21B); 2) the appearance of the spermatheca (bulga convex dorsally and ventrally and much shorter than hilla); and 3) the less angular ventral margin of the ventral anal lobe.

DISCUSSION

Most of the extant *Jellisonia* material was examined during this revision (1,261 specimens). Specimens of which the author is aware, but was unable to examine, include: a pair of *J. ironsi* in the collection of Professor J.C. Beaucournu (from Traub’s series from Zapotlanejo,

Jalisco, Mexico, 1959), one female *J. ironsi* reported by Smit (1958) from El Salvador, 1953, ex *B. musculus griseus* [= *B. musculus*], the holotype and 10 paratype males of *J. amadoi* (see Remarks), and the holotype male and 11 paratypes (5 males, 6 females) of *J. mexicana* (see Remarks). There are also a number of specimens cataloged Ayala-Barajas et al. (1988) in the holdings of UNAM that were not examined. These appear to belong to the same series as those that were examined and include approximately 85 specimens (37 males, 48 females). Although the genus was described in 1944, the first specimens collected in 1933 (*J. h. breviloba*) were not described until 1950. During the 1950s, seven species were described, one incorrectly placed in *Jellisonia* (*J. ortizi*), two that are synonymized in this revision (*J. bonia* and *J. dybasi*), and two the status of which is altered herein (*J. h. hayesi* and *J. h. breviloba*). With a frenzy of collecting in the 1960s (736 specimens, or 58% of the total known specimens), only one new species was described (*J. johnsonae*). From 1970 to date, relatively few specimens have been collected (203 specimens, or 16% of the total known specimens); however, four new species were described (*J. amadoi*, *J. guerrensis*, *J. mexicana*, and *J. painteri*). Traub (1950) recognized two groups within the genus (*klotsi/hayesi* complex and the *bullisi/ironsi* complex) that might constitute different subgenera. With the availability of additional material, these two complexes are here treated as subgenera (*Jellisonia* and *Pleochaetoides*).

Gaps in our knowledge of the distribution of this genus and yet undiscovered new species probably exist in the mountain regions of El Salvador, Guatemala, Honduras, Nicaragua, and Panama. The flea fauna of El Salvador, Honduras, and Nicaragua are particularly unexplored. Belize and the Yucatán Peninsula (states of Campeche and Yucatán) have no reported records of *Jellisonia*. The ecological parameters of the mountainous topography and cloud forests of these regions necessary to support the genus are lacking and the genus is probably not represented there.

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